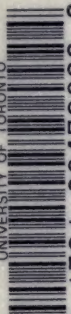


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Dept: of Zoology
Guide to the gallery of Birds

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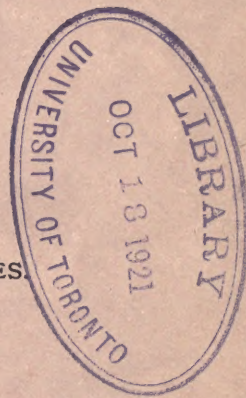
GUIDE
TO THE
GALLERY OF BIRDS
IN THE
DEPARTMENT OF ZOOLOGY,
BRITISH MUSEUM (NATURAL HISTORY).

Part I.

GENERAL SERIES.

SECOND EDITION.

WITH 1 PLATE AND 7 TEXT-FIGURES.



LONDON.

PRINTED BY ORDER OF THE TRUSTEES
OF THE BRITISH MUSEUM.

1921.

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GUIDE

GALLERY OF BIRDS

DEPARTMENT OF GEOLOGY
BRITISH MUSEUM (NATURAL HISTORY)



PRINTED BY TAYLOR AND FRANCIS,
RED LION COURT, FLEET STREET.



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pt. 1

PREFACE

TO THE FIRST EDITION.

THIS Guide to the General Series of Specimens in the Bird Gallery has been prepared by Mr. W. R. Ogilvie-Grant, Assistant in the Zoological Department. He has also carried out the arrangement of the Bird Gallery in its present form. The visitor should notice that at the side of each recess in the gallery the common names of the kinds of birds there exhibited are displayed in large capitals, whilst a label is placed on the glass front of each case showing the common name of any specially interesting or well-known bird which is near the label. Further, every specimen has now attached to its stand, not only its name but a number which is a reference number for the Guide.

E. RAY LANKESTER.

March 16th, 1905.

IN view of the increased cost of printing, it has been thought desirable to suspend the publication of the complete Guide to the Gallery of Birds. This consisted of Parts I. and II.

together, an Appendix on the structure of Birds and a series of 25 Plates. A First Edition of Part I., without the Appendix and the Plates, appeared in 1905. The present Guide is practically a reprint (with a few verbal corrections) of that issue, with the addition of the Appendix and Plate XXV. Plates I.-XXIV. can be purchased separately (price 1s. 6d.).

The statements in the Preface to the First Edition are no longer completely in accordance with the method of labelling adopted in the Bird Gallery.

SIDNEY F. HARMER,

Director.

BRITISH MUSEUM (NATURAL HISTORY),

Cromwell Road,

London, S.W. 7.

March, 1921.

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~~and page~~

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DESCRIPTION OF THE SPECIMENS • IN THE BIRD GALLERY.

IN this Gallery, which is devoted to the exhibition of mounted specimens of the general series of birds, the contents are arranged continuously in the pier-cases, the order commencing on the right hand as the visitor enters, and finishing on the left.

Most of the cases occupying the centre and recesses of this Gallery belong to a special series illustrating the nesting-habits of British birds which are described in Part II, published separately, of the Guide.

The specimens in the wall-cases and detached cases not belonging to the nesting-series have each a number attached which is referred to in this guide by thick black figures enclosed in brackets.

All the species of birds recorded on the British list will be found incorporated with the general series in their proper places, and marked with one of the following numbers on differently coloured discs, which indicate :—

- (1) Resident. Breeds in this country.
- (2) Regular summer visitor. Breeds.
- (3) Regular autumn, winter or spring visitor. Does not breed.
- (4) Occasional visitor. Used to breed.
- (5) Occasional visitor. Never known to breed.

In addition to the above a complete series of British birds will be found exhibited in the pier-cases in the Pavilion at the end of the Gallery.

The arrangement adopted in the Gallery is as follows :—

AVES.

Subclass I. SAURURÆ. (Lizard-tailed Birds.)

Order Archæopteryges.

FAMILY.	ENGLISH NAME.	CASE.
Archæopterygidæ	Archæopteryx, or Griffon-bird.	Right-hand side of entrance to Gallery.

Subclass II. NEORNITHES. (Modern Birds.)

Section A. RATITÆ.

Order I. Struthioniformes.

Struthionidæ	Ostriches.	1 and central case in bay.
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Order II. Rheiformes.

Rheidæ	Rheas.	1 & 2.
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Order III. Dinornithiformes.

Dinornithidæ	Moas.	3.
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Order IV. Æpyornithiformes.

Æpyornithidæ	Madagascar Moas.	3.
--------------------	------------------	----

Order V. Casuariiformes.

I. Dromæidæ	Emus.	4.
II. Casuariidæ	Cassowaries.	5 & 6 and central case.

Order VI. Apterygiformes.

Apterygidæ	Kiwis.	5.
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Order VII. Tinamiformes.

Tinamidæ	Tinamous.	Central table-case.
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Section B. CARINATÆ.

Order I. Galliformes.

Suborder 1. PERISTEROPODES.

I. Megapodiidæ	Megapodes, or Mound-builders.	7.
II. Cracidæ	Curassows and Guans.	7 & 8.

Suborder 2. ALECTOROPODES.

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II. Tetraonidæ		
	Grouse.	17 & 18.

Order II. Pterocletiformes.		
FAMILY.	ENGLISH NAME.	CASE.
Pteroclidæ	..... Sand-Grouse.	Table-case.
Order III. Turniciformes.		
Turnicidæ	..... Hemipodes, or Bustard-Quails.	Table-case.
Order IV. Columbiformes.		
I. Dididæ	..... Dodo, Solitaire.	Table-cases, and picture in cases 19-20.
II. Didunculidæ	..... Tooth-billed Pigeon.	19.
III. Columbidae	..... Pigeons.	19 & 20.
Order V. Ralliformes.		
I. Rallidæ	..... Rails.	22.
II. Heliornithidæ	..... Finfoots.	22.
Order VI. Podicipediformes.		
Podicipedidæ Grebes.	21.
Order VII. Colymbiformes.		
Colymbidæ Divers.	21.
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Spheniscidæ Penguins.	Central case.
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II. Procellariidæ Petrels.	23 & 24.
Order X. Alciformes.		
Alcidæ Auks.	24.
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I. Stercorariidæ Skuas.	25.
II. Laridæ Gulls and Terns.	25 & 26.
Order XII. Charadriiformes.		
I. Dromadidæ	..... Crab-Plovers.	27.
II. Chionididæ	..... Sheathbills.	27.
III. Attagidæ	..... Seed-Snipes.	27.
IV. Charadriidæ	..... Plovers.	27 & 28.
V. Cursoriidæ	..... Coursers.	29.
VI. Glareolidæ	..... Pratincoles.	29.
VII. Parridæ	..... Jacanas.	29.
VIII. Oedienemidæ	..... Stone-Plovers.	29.
IX. Otididæ	..... Bustards.	29 & 30 and central case.
Order XIII. Opisthocomiformes.		
Opisthocomidæ Hoatzins.	Table-case.

BIRD GALLERY.

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III. Eurypygidæ Sun-Bitterns.	31.
IV. Cariamidæ Cariamias.	31.
V. Psophiidæ Trumpeters.	31.
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III. Scopidæ Hammer-head Storks.	35.
IV. Ciconiidæ Storks.	35 & 36.
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Anatidæ } Mergansers, Ducks, Geese, {	37-42 and central case.
 } Swans.	

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Cathartidæ Turkey-Vultures.	45 and table-case.
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---------------	------------------------	-----

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VIII. <i>Todidæ</i>	Todies.	58.
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XLI. Sturnidæ	Starlings.	83.
XLII. Ptilonorhynchidæ	Bower-birds.	Central table-case.
XLIII. Paradisæidæ	Paradise-birds.	Central case.
XLIV. Corvidæ	Crows.	83 & 84.

Subclass I. SAURURÆ.

[Right-hand side of entrance to Gallery. Restoration and framed cast of fossil remains.]

Fossil remains, hitherto only found in the lithographic slate of Solenhofen, in Bavaria, indicate that birds existed in the Upper Jurassic geological age, differing in certain points from those now existing. The jaws were armed with teeth, and the three digits of the fore-limb were furnished with claws. The tail consisted of a series of elongated vertebræ, gradually tapering to the extremity, each vertebra bearing a pair of well-developed feathers. As the skeleton of the tail rather resembled that of a Reptile than that of a modern Bird, the name *Saururæ*, signifying 'Lizard-tailed,' has been applied to the group.

The best known representative of this subclass is the *Archæopteryx lithographica* (1). A cast of the fossil remains of this remarkable form is exhibited at the entrance to the Bird Gallery. For full particulars the reader is referred to the ninth edition of the "Guide to the Fossil Mammals and Birds," pp. 93-95 (1909).

Subclass II. NEORNITHES.

This Subclass includes all the remaining forms, both recent and fossil, included in the Class Aves, and may be divided into two sections: A. *Ratitæ*, and B. *Carinatæ*. The first contains the Struthious Birds and the Tinamous, and the second all the existing Birds not included in the previous division.

Section A. RATITÆ.

STRUTHIOUS BIRDS AND TINAMOUS.

In this Subclass are included all the great flightless species of the Ostrich-tribe commonly known as the Struthious Birds, as well as the Tinamous. The name *Ratitæ* is derived from the raft-like breast-bone of the former, which is devoid of a keel for the attachment of the pectoral muscles. As these muscles gradually ceased to be used they became degenerate, the keel for their attachment disappeared, and, as a result, the birds lost the power of flight. Though at the present period represented by comparatively few members, which are confined to Africa, the Papuan group of islands, Australia, New Zealand, and South America, the "*Ratites*" were formerly much more numerous in species, and ranged over parts of the earth where they have long since ceased to exist. A number of fossil forms are known.

The *Ratitæ* may be distinguished from all other birds by the bones of the palate, the pterygoid never forming a jointed articulation with

the palatine, but forming a close union either by fusion or by overlapping suture with the base of the vomer.

The majority of the members of this group have become flightless, a fact which has brought about many modifications of the skeleton and feathers. The Tinamous alone have retained the power of flight.

The Ratitæ are divisible into seven Orders, probably derived from three distinct stocks. Each Order can be readily defined, and presents one or more points which indicate extreme specialization.

On account of the structure of the palate, the members of this section may be regarded as the most primitive of living birds.

The seven Orders of the Ratitæ are the following :—

- | | |
|-------------------------|--|
| 1. Struthioniformes . | One genus, <i>Struthio</i> . |
| 2. Rheiformes | Two genera, <i>Rhea</i> and <i>Pterocnemia</i> . |
| 3. Dinornithiformes . | } Numerous genera. Extinct forms. |
| 4. Æpyornithiformes } | |
| 5. Casuariiformes ... | Two genera, <i>Casuarus</i> and <i>Dromæus</i> . |
| 6. Apterygiformes ... | One living genus, <i>Apteryx</i> , and two extinct genera. |
| 7. Tinamiformes ... | Numerous genera. |

The characters by which the Orders are distinguished are fully explained in the table-case in the first bay.

[Case 1 and
Central Case
in Bay.]

Order 1. STRUTHIONIFORMES. OSTRICH-TRIBE.

Though closely allied to the Rheas, which they resemble in general appearance, the members of this order may be at once distinguished from all others by possessing only *two* toes. Of these the one corresponding to the middle of the three anterior toes in ordinary birds (the third of the complete set) is much the largest and supports the greater part of the weight. It bears a stout pointed nail. The smaller outer (or fourth) toe often wants the nail. The whole of the head and neck as well as the legs are bare, or only covered with short down. The body-feathers are single, having no aftershaft, and the feathers of the wings and tail (corresponding to the 'remiges' and 'rectrices' of ordinary birds) are of considerable size, but soft and plumose.

Family STRUTHIONIDÆ. OSTRICHES.

The Ostriches, the largest of living birds, are represented by the single genus *Struthio*, which contains at least four living species

inhabiting Africa and Arabia. In former times their range was much more extensive, and fossil forms have been found in the Pliocene of the Siwalik Hills of India and in the Upper Miocene of Samos. The Common or Northern Ostrich (*S. camelus*) (3) is found in Northern and Western Africa, and ranges eastwards to Abyssinia, Arabia, and South Palestine; a somewhat different form, the Masai Ostrich (*S. massaicus*) (3a), inhabits East Africa; in Somali-land and Central Africa *S. molybdophanes* occurs; and in South Africa its place is taken by *S. australis* (2), which is exhibited in all stages of plumage, from the nestling to the adult, in the central Case.

The males are larger than the females, standing about eight feet high, and in all the species are black with white wings and tail. They may, however, be readily distinguished *inter se*, for *S. camelus* and *S. massaicus* have the skin of the head and neck of a bright flesh-colour, while in the other two species it is grey; *S. camelus* and *S. molybdophanes* have a horny shield on the crown, which is wanting in *S. massaicus* and *S. australis*. The plumage of the females and young males is brownish-grey. The general tint of the eggs laid by all four species is pale cream-colour, but the texture of the shell differs greatly.

Ostriches inhabit the sandy wastes and deserts, as well as districts studded with low bushes, and are often found associating with herds of zebras and antelopes. Though as many as fifty individuals may sometimes be seen in company, they are more often met with in parties of five or six, especially during the breeding-season, when the polygamous male is accompanied by several hens. The hens belonging to one male lay their eggs in the same nest, which is a shallow excavation dug in the sand. As many as thirty eggs are sometimes deposited in the pit, and many more are dropped around which are said to serve as food for the newly-hatched young. The contents of an egg are equal to about two dozen hen's eggs. The male undertakes nearly the whole duty of incubation, which lasts for six or seven weeks, being occasionally relieved by the hens during the daytime. He especially looks after the nest at night, and broods over the eggs, though in many tropical countries the latter are covered over with sand and left to the heat of the sun during the daytime.

The Ostrich was formerly much hunted for the sake of its curled plumes, but since the establishment of Ostrich-farms the chase, except for sport, has been almost abandoned. On the large South African farms, where numbers of birds are annually reared, the plumes are plucked every six or nine months.

[Cases
1 & 2.]

Order II. RHEIFORMES. RHEA-TRIBE.

In South America the place of the Ostriches of the Old World is taken by an allied group of birds called Rheas, or "American Ostriches," which are distinguished by certain structural characters, and externally by the presence of three toes furnished with compressed claws, by the fully-feathered head and neck, and by the absence of a conspicuously feathered tail. The wings also are proportionately larger, and are covered with long slender plumes. As in the *Struthionidæ*, the body-feathers are single, without an aftershaft, a character which separates these birds from the Emus and Cassowaries.

Family RHEIDÆ. RHEAS.

The Rheas include three South American species, viz.:—Rothschild's Rhea (*Rhea rothschildi*) (4), found from Southern Brazil and Bolivia southwards; the Great-billed Rhea (*R. americana*) inhabiting North-east Brazil; and Darwin's Rhea (*Pterocnemia pennata*) (6), from the southern part of the continent. All bear considerable resemblance to their African allies, and are often called "South American Ostriches," but they are smaller and easily distinguished by the characters already mentioned.

They inhabit the great Pampas and scrub-covered plains in larger or smaller flocks, often associating with deer and guanacos. In the month of July the pairing-season begins, and the males then utter a deep resonant booming noise and give vent to various weird sounds. The young males are driven from the flock, and the cock birds fight viciously with one another for the possession of the females. The battles are conducted in a curious manner, the combatants twisting their long necks together and biting at each other's heads with their beaks, while they turn round and round in a circle, pounding the ground with their feet. The females of the flock all lay together in a natural depression of the ground, each hen laying a dozen or more eggs. If the females are many, the male usually drives them away before they finish laying, and commences to sit. The hens then drop their eggs about the plains, and, from the large number of wasted eggs found, it seems probable that more are dropped out of the nest than in it. The colour of the egg when fresh is a fine golden yellow. The young when hatched are assiduously tended and watched over by the cock-bird, who charges an intruder with outstretched wings.

Rheas take readily to water, and can swim across a river several hundred yards wide, the body being almost entirely submerged. They are easily acclimatized, and often kept in parks in this country, where they frequently breed. The feathers are of little commercial value.

Order III. DINORNITHIFORMES.

Family DINORNITHIDÆ. MOAS.

[Case 3.]

New Zealand was formerly inhabited by a gigantic race of birds called Moas, some species of which considerably exceeded in size the modern Ostriches. The situation and state of preservation of the abundant remains which have been found indicate that they existed till comparatively recent times, and were probably exterminated by the present Maori inhabitants of the islands. Feathers which have been found associated with the bones show the presence of a large after-shaft, as in the Emus and Cassowaries; but some of the species resemble the Kiwis (*Apteryx*) in possessing a hind toe. Wings were absent, and the shoulder-girdle was only represented by a vestige.

The Moas are represented by several genera, the largest member being *Dinornis maximus* (7), a gigantic bird, of which a skeleton is exhibited. Some of the species seem to have survived until about four or five hundred years ago, or even later in the South Island, but being flightless, their extinction by the natives, who hunted them for their flesh, was an easy task.

Besides large quantities of bones, some of which have been obtained from native cooking-places, portions of the skin and feathers have been discovered, as well as pebbles used to aid digestion, and eggs both whole and fragmentary. For further particulars the visitor is referred to the ninth edition of the "Guide to the Fossil Mammals and Birds," p. 92 (1909).

Order IV. ÆPYORNITHIFORMES.

Family ÆPYORNITHIDÆ. MADAGASCAR MOAS.

[Case 3.]

Fossil remains from superficial deposits in Madagascar show the existence, in a very recent geological period, of several species of Ratite birds, which bear much resemblance to the *Dinornithidæ*. One of their most striking characteristics was the enormous size (both absolute and relative) of the egg, in which respect they resemble the Kiwis (*Apteryx*) of New Zealand rather than the Moas. The largest species, *Æpyornis titan* (8), of which a cast of the leg is exhibited, stood about 10 feet high, and its eggs exceed all others in size, some of the shells containing from two to three gallons of liquid, or an amount equal to the contents of about one hundred and fifty hen's eggs. An example exhibited measures:—long circumference 2 ft. 9 ins., girth 2 ft. 5 ins. These birds are believed by many to be identical with the famous "Roc" mentioned by the traveller Marco Polo, and it is supposed that some of the species were in existence not more than two hundred years ago. [Cf. Fossil Guide, p. 92 (1909).]

Order V. CASUARIIFORMES. EMUS AND CASSOWARIES.

In the two families (*Dromæidæ* and *Casuariidæ*) comprising this order the wings are still more reduced in size and the "fingers" are represented by one claw-bearing digit. The body-feathers have an aftershaft or accessory plume as long as the main feather.

Family I. DROMÆIDÆ. EMUS.

[Case 4.] The Emus agree with the Cassowaries in possessing a large aftershaft to the body-feathers, but the bill is broad and flat, the head and upper part of the neck have a scanty hair-like covering, and horny casque, helmet and ornamental wattles are wanting. The wings are exceedingly small and, like the tail, entirely concealed beneath the general covering of feathers. The three toes have claws of similar form and nearly equal size.

The only species surviving at the present time is the common Emu (*Dromæus novæ-hollandiæ*) (9), which inhabits Australia. A small Black Emu (*D. parvulus*) was formerly found on the Island of Decrès or Kangaroo, but is now extinct and known only from two specimens preserved in the Paris Museum and from a skeleton in the Museum at Florence. It is possible that a third species existed within recent times, for the Tasmanian form was apparently distinct from the Australian species. These great birds frequent the desert sandy plains and open bush-districts, feeding on fruit, roots, and herbage; they are very keen-sighted, and, like their allies, run with great rapidity. Unlike the Rheas and Ostriches, they are monogamous, though found in small parties after the breeding-season. The female deposits her eggs, from seven to thirteen or more in number, in a hollow scratched in the ground, and the male performs the duties of incubation, which last for about eight weeks. The young are greyish-white, beautifully striped with black, and the eggs when first laid are of a rich sap-green, but this colour gradually fades to dull greenish-black.

The female is rather smaller than the male, and both sexes possess a remarkable pouch formed by the inner lining of the windpipe. This pouch leaves the trachea through a slit in the anterior wall, and can be inflated at the will of the bird. The inflation is probably connected with the low, resonant, booming note uttered during the nesting-season. Owing to the constant persecution to which they are subjected, Emus are becoming scarcer year by year. Being hardy birds they are easily domesticated and breed readily in parks both in this country and in Europe.

A fossil species occurs in the Pleistocene of Queensland and New South Wales.

Family II. CASUARIIDÆ. CASSOWARIES.

The Cassowaries (10-20) resemble the Emus (*Dromæidæ*) and the Moas [Cases 5, 6, & Central Case.] (*Dinornithidæ*), inasmuch as the feathers clothing the general surface of the body appear to be double, the aftershaft or accessory plume being as long as the main feather. They differ, however, in the peculiar structure of the wing, which is extremely small and has the quill-feathers reduced in number to five or six. These consist of stout bare shafts without any barbs, and project conspicuously beyond the body-feathers. The bill is compressed, the top of the head carries a horny casque or helmet, varying in form in the different species, and some part of the neck is bare, generally more or less ornamented with caruncles or wattles and brightly coloured. The inner toe is armed with a long sharp, powerful claw.

About fourteen species are known, and with the exception of the Australian Cassowary (*Casuarus australis*) (10), which is found in the Cape York Peninsula and extends as far south as Rockingham Bay, all are natives of the Papuan group of islands extending eastward to New Britain. They inhabit the dense forests and scrub, and are never met with in the open plains. The nest—a mere depression among the fallen leaves and débris below bushes and undergrowth—contains from three to six large eggs of a bright green colour. Incubation lasts for about seven weeks, and, as in the allied forms, is performed by the male bird, who also tends the young when hatched. The nestlings are clothed in rusty brown with darker stripes, and at a later period become more tawny, finally assuming the glossy black hair-like plumage of the adult. The wattles and bright colours on the neck are assumed at a comparatively early period, but the helmet is very gradually developed. Cassowaries run with great swiftness, and when evading pursuit leap over high obstacles with wonderful agility; they are also strong swimmers, and able to cross wide rivers with ease. Their cry is a loud, harsh, quickly repeated guttural sound audible at a great distance. Their skin is manufactured into mats and head-ornaments by the natives.

Order VI. APTERYGIFORMES.

Family APTERYGIDÆ. KIWIS. (Plate I.)

The Kiwis are the smallest of the flightless *Ratitæ*, and differ from all existing forms of Struthious birds in possessing a small hind toe or hallux and in the length of the bill, the nostrils of which are placed near the tip, instead of at the base as is the case in most birds. The feathers have no aftershaft. The wings are so small that they are completely concealed by the general body-clothing, and there is no visible tail.

[Case 15.] The legs and feet are very stout and the claws long, curved, and sharp-pointed.

The four or five known species are all natives of New Zealand. They are nocturnal birds and sleep during the day in some secluded retreat in burrows in the ground or under tree-roots; in the dusk they are lively enough, creeping quietly about in search of worms, insects, and berries, for which they hunt with a continual sniffing sound, much like that made by a hedgehog. Though formerly common at low elevations, they are now chiefly met with on the slopes of the mountains, where the dense undergrowth affords them some protection from their enemies. Though found in small flocks at certain seasons of the year, they separate off in pairs in the breeding-season. The nest is merely an enlarged space at the end of a burrow, lined with dry fern and herbage, and contains one or two very large white eggs, enormous compared with the size of the bird, and equal to about a quarter of its weight. The male performs most, if not all, of the duties of incubation. The loud whistling note, from whence the name Kiwi is derived, is chiefly uttered on bright nights. The Maories greatly esteem the flesh of these birds, and the systematic way in which they are hunted must sooner or later end in their extermination.

Mantell's Kiwi (*A. mantelli*) (21), inhabiting the North Island, Shaw's Kiwi (*A. australis*) (22) [Pl. I.], a smaller form from the South Island, and *A. lawryi*, of Stewart Island, are streaked species; while Owen's Kiwi (*A. oweni*) (23) and Haast's Kiwi (*A. haasti*) (24), occurring both in the North and South Islands, belong to a differently marked group, with the feathers transversely marked with blackish bars.

Order VII. TINAMIFORMES.

Family TINAMIDÆ. TINAMOUS.

[Central table-case.] The Tinamous are sometimes placed at the end of the subclass of Carinate Birds, the sternum being provided with a keel, while all the members are capable of flight; but they agree so well in their other osteological characters with the Struthious group that they are here included in the same subclass.

The Tinamous are Partridge-like birds inhabiting Mexico and Central and South America, and vary in size from species as large as a Fowl to birds no larger than a Quail. The bill is rather long and generally somewhat curved, the head small, the neck long and rather thin, the wings short and rounded, and the tail-feathers greatly abbreviated and more or less concealed by the upper tail-coverts, from which in many cases they are hardly distinguishable. Most of the genera possess four

toes, the hind toe or hallux being generally developed. Powder-down patches are present near the rump in certain forms. The eggs are specially remarkable, being highly glossed or burnished, and unlike those of any other bird.

Between sixty and seventy species are enumerated in the most recent treatise on the group. All are essentially ground-birds, and rarely perch, but haunt the undergrowth of thick forests, grassy flats interspersed with bushes, or open pampas. They are great runners, and generally difficult to flush; but once on the wing, their flight is strong and swift. The cry is a mellow whistle composed of several notes, and varies somewhat in the different species. The nest, a hole scraped in the ground under the shelter of some bush or tuft of grass, is lined with dry herbage and leaves, and, as in the Struthious birds, the male undertakes the duties of incubation. The number of eggs is said to vary from four to sixteen, the latter number being probably the produce of more than one female. The eggs vary in colour in the different genera, some being vinous, reddish-chocolate, or dull purple, others dark blue, bluish-green, sage-green, or primrose-colour, and the shell in all resembles glazed porcelain or burnished metal.

In all the Tinamous the plumage is inconspicuous, the general colour being some shade of brown, greyish or buff, more or less mottled and barred. One of the largest species is *Tinamus solitarius* (25), a native of Paraguay and Southern Brazil; but the most familiar is the Rufescent Tinamou (*Rhynchotus rufescens*) (27), found in the open pampas from Brazil southwards, and known as the "Perdiz grande." It has been introduced into England, and stands our climate well; but as a game-bird it cannot be called a success, being of solitary habit and difficult to flush. Once on the wing its flight is very fast and extraordinarily noisy; with constantly vibrating wings, the bird flies straight away for about 1000 yards before it slopes gradually to the earth. Of the other genera belonging to this section possessing a hind toe (*Tinaminæ*) examples will be found in *Nothoprocta perdicaria* (28) and several species of *Crypturus* (29-32). Two genera have no hind toe and form the section *Tinamotidinæ*; examples of these will be found in *Tinamotis pentlandi* (33) and *Calopezus elegans* (34), the latter remarkable for its long crest of black feathers.

Section B. CARINATÆ. CARINATE BIRDS.

All existing birds which do not belong to the *Ratitæ* are included in one great division—the *Carinatæ*—characterised by the fact that the pterygoid bone articulates with the palatine by means of a joint. The vomer is much reduced or absent.

In some few birds belonging to several different subdivisions of this great group the keel of the breast-bone is extremely reduced in size, and the power of flight is almost or entirely lost, as is the case in the flightless *Ratitæ*.

The division of the *Carinatæ* into orders and families, and the mutual relations of these groups to one another, are subjects of great difficulty upon which zoologists are by no means as yet agreed. The classification adopted in this gallery, which represents the general result of much recent work, must therefore be looked upon as provisional.

Thirty-one Orders are recognised in this scheme.

Order I. GALLIFORMES. GAME-BIRDS.

This order is composed of the great bulk of the species commonly known as "Game"-Birds. Nearly 400 different kinds are known, forming a well-defined group.

The bill is short and stout, the upper mandible being arched and overhanging the lower mandible. The body is well built and robust, the great development of the pectoral muscles giving these birds a well-fed, sturdy appearance. The legs and toes are fairly long and strong and well adapted for walking and running, and the latter are provided with stout curved claws, suitable for scratching and digging up roots, insects, and other food. The hind toe is always present, but varies in size and position.

The feathers covering the body are provided with a well-developed aftershaft.

The young when hatched are covered with soft, beautifully patterned down (except in the Megapodes, *vide infra*), and are able to run within a few hours of the time they emerge from the shell. The eggs, especially of the smaller species, are often numerous, and, when spotted, have only a single set of surface-marks, which are easily removed, none of the pale underlying spots characteristic of the Sand-Grouse, Hemipodes, and Wading-birds being found.

Two Suborders are recognised.

Suborder I. PERISTEROPODES.

The first suborder of the Game-Birds includes two families, which are easily distinguished by the following characteristics:—The hind toe (*hallux*) is on the same level as the other toes, and the inner notch of the breast-bone (*sternum*) is less than half the length of the entire breast-bone. The first family includes the Megapodes and Brush-Turkeys (*Megapodiidae*); the second the Curassows, Penelopes, and Guans (*Cracidae*).

Family I. MEGAPODIIDÆ. MEGAPODES.

The Megapodes or Mound-builders are remarkable not only in having [Case 7.] the oil-gland at the base of the tail nude, but for their peculiar nesting-habits, which possess the highest interest. The eggs, which are very large for the size of the birds, are laid at considerable intervals, and either deposited in holes dug in the sand or in a mound of soil and decaying vegetable matter raised by one or more pairs of birds. The young are hatched as in an incubator by the warmth of the mound or sand, *without* the aid of the parent birds, and on leaving the shell are fully feathered, able to fly and take care of themselves. In all the species the legs and feet are very large and strong, and well adapted for digging and scratching.

Of the true Megapodes—all dull-coloured birds—examples will be found in *Megapodius cumingi* (37) and *M. freycineti* (38). Like most of the other members of this family, they form a nesting-mound by kicking the soil and dead vegetable matter backwards into a common centre, thus forming a large heap, which is usually situated in dense jungle. By the efforts of successive generations this sometimes attains incredible dimensions, one instance being on record where the circumference round the base of the mound was no less than 150 feet. Each mound is said to be the property of one pair only, and the female, having deposited her eggs and covered them up, leaves them to be incubated by the heat of the accumulated decomposing matter.

As may be seen by the young of *M. cumingi* (37) taken from the mound, the young bird when hatched is well-feathered and able to fly. The egg is remarkably large in proportion to the size of the parent.

The most handsomely marked members of the group are Wallace's Megapode (*Eulipoa wallacei*) (40), from the Moluccas, and *Lipoa ocellata* (41), from Southern and Western Australia. To the same family belong the Australian Brush-Turkeys (*Catheturus*) (43) and their allies from New Guinea (*Talegallus*) (42). The most remarkable is the Maleo (*Megacephalon maleo*) (39), a native of Celebes, with its delicate pink breast and an ornamental bare knob on the head.

Unlike the other members, this bird makes no mound, but lays its eggs, which are deposited at intervals of ten or twelve days, in holes in the sand on the sea-beach just above high-water mark. The birds visit the shore in pairs. Several females deposit their eggs in the same hole, and having covered them with sand return to the forest and take no further notice of them.

Family II. CRACIDÆ. CURASSOWS AND GUANS.

[Cases
7, 8.]

The Curassows and Guans are distinguished from the Megapodes by having a tufted oil-gland, and differ entirely in their breeding-habits. The eggs, which are white and usually two in number, are laid in a nest made either in a tree or on the ground, and are incubated in the usual manner. The young when hatched are covered with down.

Nearly sixty species are known, all inhabitants of the forest-regions of Central and South America, where they seem to take the place of the larger Game-Birds of the Old World.

They may be grouped into three subfamilies:—A. With the upper mandible higher than broad (1. *Cracinae*). B. With the mandible broader than high and with the top of the head mostly naked, and having an elevated cylindrical, occipital helmet (2. *Oreophasinae*), or, with the top of the head feathered and without a helmet (3. *Penelopinae*).

The true Curassows have the feathers on the top of the head semierect and curled at the extremity, and are represented by *Crax alector* (44), a native of the northern parts of South America. Some of the allied species differ in having a swollen knob at the base of the upper mandible, and wattles at the base of the lower. They are readily domesticated in their native country and are valued as food.

One of the most remarkable is Lord Derby's Mountain-Pheasant (*Oreophasis derbianus*) (46), with its curious helmeted head, the sole representative of its subfamily. This species is only found in Guatemala, and is apparently restricted to the higher forests of the Volcan de Fuego. Like the Curassows and Guans, it feeds on fruits in the higher branches of the forest-trees during the early morning, and as day advances descends to the underwood, where it spends its time basking or scratching among the leaves.

The Guans and Penelopes form the last subfamily, which includes six genera and contains the majority of the species. Of the Penelopes (*Penelope*) (47–51), five species are exhibited, and may be recognised by their naked chin and throat with a median wattle. The Black Penelope (*Penelopina nigra*) (52), from the highlands of Guatemala, is the sole representative of the second genus, in which the sexes differ in plumage,

the female being barred with rufous. The Guans (*Ortalis*) (53-55), of which three species are shown, are very similar birds to the two former, but there is a thin band of feathers down the middle of the naked throat, and no wattle. The remaining three genera, *Pipile* (56), *Aburria* (57), and *Chamæpetes* (58, 59), are remarkable in having the inner web of the first two or three flight-feathers deeply excised.

Suborder II. ALECTOROPODES. TRUE GAME-BIRDS.

This group includes the Pheasants, Partridges, and Grouse, which normally nest on the ground. They are characterised by having the hind toe (*hallux*) raised above the level of the other toes, and by having the inner notch of the breast-bone (*sternum*) more than half the length of the entire sternum.

Family I. PHASIANIDÆ. PHEASANTS, PARTRIDGES, AND QUAILS.

The large number of Game-Birds comprising this family are distinguished from the Grouse by the following characters. The nostrils are never hidden by feathers, and the legs are either feathered partially as in the Snow-Partridges (*Lerwa*) (164) or wholly naked and often armed with one or more pairs of spurs. The toes are always devoid of feathers and never pectinate along the sides, the horny comb-like appendages so characteristic of the Bare-toed Grouse being invariably absent.

This great family has been divided into the subfamilies *Odontophorinæ*, *Phasianinæ*, and *Perdicinæ*, the first containing the American Partridges and Quails, the second the Pheasants and Peacocks with their allies the Turkeys and Guinea-Fowls, and the third the Old-World Partridge-like forms.

Subfamily I. *Odontophorinæ*. American Partridges and Quails.

The American Partridges (*Odontophorinæ*) are distinguished by [Case 9.] having the cutting-edge of the lower mandible serrated or provided with a tooth-like process, well marked in the great majority of species, but in some instances less distinct.

The Scaly Partridge (*Callipepla squamata*) (60) is a native of the high barren plateaus of Mexico and the States immediately to the north. In both sexes the black edges to the feathers give the plumage a scaled appearance.

Of the Crested Quails (*Eupsychortyx*) eight small species are known to inhabit Central America and the north-west of South America. An example of this group may be seen in the White-faced Crested-Quail (*E. leucopogon*) (62).

[Case 9.] Closely allied to the Crested Quails are the Colins or Bob-whites (*Ortyx*), of which ten different kinds are found in the United States of N. America and Mexico, distinguished from the last genus by the absence of a crest. Of these the best known is the Virginian Colin or Bob-white (*O. virginianus*) (61), from the Eastern United States, which has been introduced into various parts of the Old World. This is the most prolific of North American Game-Birds, the number of eggs varying from twelve to eighteen. As many as thirty-seven eggs have been found in one nest, but they were doubtless the product of more than one hen.

One of the most beautiful forms is the Plumed Partridge or Mountain-Quail (*Oreortyx pictus*) (64), found in the Sierras of the Western States of North America. Both male and female are nearly alike in plumage, and have a very long crest composed of two feathers.

The next genus includes three species, of which the beautiful Californian Quail (*Lophortyx californicus*) (65) is a familiar example frequently to be seen in aviaries. It inhabits the brush-covered hills and cañons of the Western States of North America, ascending in Lower California to an elevation of about 9000 feet.

The Harlequin-Quails (*Cyrtonyx*), often known as "Fool-Quails" on account of their extreme tameness, are found in Central America, Mexico, and the States immediately to the north. Of the three species known the Massena Quail (*C. montezumæ*) (66) is the handsomest, and inhabits the rocky ravines among the higher ranges, being found in summer at elevations of from 7000 to 9000 feet.

Larger birds of this group are the Thick-billed Partridges (*Odontophorus*) (67-69), of which more than a dozen species are known from the forests of Central and South America. They seldom fly if they can avoid doing so, and when flushed betake themselves to the branches of trees.

Another forest bird is the Long-nailed Partridge (*Dactylortyx thoracicus*) (70), a Central American form, remarkable, like the Harlequin-Quails, for its very long and nearly straight claws.

Four rather large species of Long-tailed American Partridge (*Dendrortyx*) (71, 72) are known from the mountain-forests of South Mexico and Central America. Two of these are exhibited, and are easily recognised by their short stout bill and comparatively long tail.

Between the second and third subfamilies of the *Phasianidæ* there appears to be no real line of demarcation, the Pheasants and Peacocks (*Phasianinæ*) and the Old-World Partridges (*Perdicinæ*) being intimately connected with one another by such forms as the Bamboo-

Partridges (*Bambusicola*), the Stone-Pheasants (*Ptilopachys*), and the Indian Spur-Fowl (*Galloperdix*). The shape of the wing is perhaps the most important distinguishing mark, and when taken in connection with the length of the tail is a useful, if somewhat artificial, character. In all the *Phasianinæ*, with the exception of the two genera *Phasianus* and *Calophasis*, the first flight-feather is much shorter than the tenth, and it is only by using the combined characters of the shape of the wing and length of the tail that the two groups can be separated.

Subfamily II. *Phasianinæ*. Pheasant-like Game-Birds.

The Pheasants and their allies the Turkeys and Guinea-Fowl may be recognised by the following characters. The cutting-edge of the lower mandible is not serrated or provided with a tooth-like process. The first flight-feather is usually *shorter*, generally *much* shorter than the tenth, rarely equal to it, except in the true Pheasants (*Phasianus*) and the Barred-backed Pheasants (*Calophasis*), but as these possess very long tails, they are at once seen to belong to the *Phasianinæ*.

The most perfect type of Pheasant-wing is found in the Argus Pheasants (*Argusianus*), where the first flight-feather is the shortest and the tenth the longest. As might be expected from the shape of the wing these birds rarely fly, and always prefer to escape by running very swiftly through the densest jungle.

The Turkeys (*Meleagris*) from North and Central America are among the largest and handsomest members of the group. The chief characteristics of adult birds are the fleshy wattles, which ornament the naked head and neck, and the erectile fleshy process on the forehead. Of the four North American forms a representative will be found in the American Turkey (*M. americana*) (73). This is a woodland-bird, generally found in flocks, which seek their food on the ground by day and roost in the highest trees. Though still found in considerable numbers in the Southern and Central United States this species was formerly abundant over a much wider range, but constant persecution has exterminated it in the Northern and Western States, and changed a once by no means shy bird into the most cunning and wary of all the Game-Birds. The Mexican Turkey (*M. gallopavo*), a mountain species inhabiting the high tablelands of North Mexico and the neighbouring States up to an elevation of 10,000 feet, is interesting as being the species from which the domestic breed of Turkey was originally derived. It differs from the American Turkey in having the upper tail-coverts and tail-feathers broadly tipped with white. The most beautiful is undoubtedly the Honduras Turkey (*M. ocellata*) (74), from Central America, the colouring of the naked head, brilliant metallic plumage, and ocellated tail combining to make up a

[Cases
9 & 10.]

magnificent whole. It will be noted that the male of this species is without the tassel-like bunch of bristles on the breast characteristic of the males of the other species.

[Case 10.] The Guinea-Fowl, including five genera, are the representatives of the Asiatic Pheasants in Africa, and form an intermediate link between the latter and the Turkeys of America. In all the species the plumage of the male and female is alike.

A very rare West African form is the Turkey-like Guinea-Fowl (*Agelastes meleagrides*) (75), which ranges from Liberia to Gaboon.

The Helmeted Guinea-Fowls (*Numida*) (77) include eight species, one of which (*N. meleagris*) (76) is the wild ancestor of our domestic breed. Their chief characteristics are the naked head surmounted by a more or less elevated bony helmet, the wattles on each side of the gape, and the blackish plumage spotted with white. As a rule they are found in flocks in the scrubby brush. Their flight is comparatively feeble, but they can run very rapidly, and if hard-pressed take refuge among the lower branches of any convenient bush or tree, also roosting there at night.

The Crested Guinea-Fowls (*Guttera*), of which several kinds are known, may be distinguished from the last group by their black crested head, pale blue-spotted plumage, and the white band along the wing. An example of these will be found in the Curly-crested Guinea-Fowl (*G. cristata*) (78) from East Africa.

Of the fifth genus the Vulturine Guinea-Fowl (*Acryllium vulturinum*) (80) is the sole representative. This very handsome bird, with its brightly coloured hackles and long pointed tail, is a native of East Africa. The legs of the male bear blunt knobs, which in some examples number as many as five.

[Central
Case.]

The Peafowl (*Pavo*) are the largest and most magnificently coloured birds of the group. Only two species are known, the common Peafowl (*P. cristatus*) (81), found throughout India, Assam, and Ceylon; and the Burmese Peafowl (*P. muticus*) (82), from the Indo-Chinese countries, the Malay Peninsula, and Java. The tail, composed of 20 feathers, is long, but entirely hidden by the upper tail-coverts which are enormously developed in the male, and form the "train." The common Peafowl frequents broken and jungly ground, where good cover and water are to be found, and is seldom met with at elevations exceeding 2000 to 3000 feet. It prefers the neighbourhood of cultivated fields, and, where numerous, does much harm to cultivation. At night the male and his harem, consisting of four or five females, roost on the lower branches of the highest trees.

Case 10.] Intermediate between the Pheasants and Peafowl is a beautiful group known as the Peacock-Pheasants (*Polyplectron*). The dense

jungles and lower hill-forests of the Indo-Malayan countries and the islands of Sumatra, Borneo, and Palawan are their home. The leg of the male is armed with two, three, and sometimes four spurs, the number being rarely the same on the two legs. The Grey Peacock-Pheasant (*P. chinquis*) (85) ranges from Sikhim to Tenasserim and eastwards to the Laos country. The female when followed by her chicks has a curious habit of carrying her tail widely spread, and the young always remain hidden beneath it. They run forward when called by the mother to pick up food, but, having eaten it, immediately retreat to their shelter. A very rare species may be seen in the Bornean Peacock-Pheasant (*P. schleiermacheri*) (86), which is peculiar to that island.

The Argus Pheasants are represented by two distinct types, both of which are exhibited in the Central Case. The true Argus Pheasants (*Argusianus*), as already stated, are remarkable for the shape of the wings, in which the most perfect Pheasant-type is found, the first flight-feather being the shortest and the tenth the longest. Even more remarkable are the enormously developed secondary quills of the male, beautifully decorated with rows of large ocelli. The Argus Pheasant (*A. argus*) (87) ranges from the Laos country and Siam through the Malay Peninsula to Sumatra, its favourite haunts being the depths of the evergreen-forests. Here a level spot, shut in by some dense cane-brake, is chosen by the male, and cleared of all dead leaves and weeds for a space of six or eight yards square, till nothing but the bare earth remains. This spot is subsequently kept scrupulously clean, and used as a dancing-ground. The male spends the greater part of the day there, and roosts at night on some tree close by. In Borneo a different and somewhat smaller species (*A. grayi*) occurs.

Of the second genus (*Rheinhardtius*) a representative will be found in Rheinhardt's Crested Argus (*R. ocellatus*) (88), one of the rarest of all the game-birds. In this species no extraordinary development of the secondary flight-feathers is found, but the tail is enormously long in the male. For many years the existence of this bird was only known from some tail-feathers in the Paris Museum, and it was not until 1883 that a few pairs were obtained by the French during the Tonkin war. A second species has recently been discovered in the native state of Pahang in the south of the Malay Peninsula.

Of the Jungle-Fowl (*Gallus*) at least four very distinct species are known to inhabit the dense jungles of the Indian Peninsula, Indo-Malayan countries, and the adjacent islands. The tail is carried low in wild birds; it is only in domestic fowls that it is raised above the back. [Case 10.]

During the moult in June, when the long tail- and flight-feathers are shed, the hackles are replaced by short feathers like those of the

[Case 10.] female. A second moult takes place in September, when the short feathers of the neck are cast, and again replaced by hackles, the wing- and long tail-feathers having by this time been renewed. This temporary plumage is doubtless protective, and parallel cases may be seen in the Black Grouse and in many of the Ducks.

It is from the Red Jungle-Fowl (*G. gallus*) (89) that all the domestic breeds of poultry are said to have been originally derived, and remarkable examples of these varieties may be seen in the Central Hall of the Museum. One of the most singular comes from Japan, and has extraordinarily elongate tail-coverts, said in some cases to attain a length of more than 12 feet. It is well known that the descendants of domestic fowls which have been allowed to escape and run wild in some of the islands of the Malay Archipelago soon revert to the wild type, and after a few generations become indistinguishable from the Red Jungle-Fowl of North India. In Ceylon a different species (*G. lafayetti*) (90) is found, the breast-feathers of the male being orange-red, while in the female they are white margined with black.

The Golden Pheasant (91) and Lady Amherst's Pheasant (92), the only representatives of the genus *Chrysolophus*, are natives of the mountains of Western China and Eastern Tibet. The splendid plumage of the males is not surpassed by that of any other bird of the Pheasant tribe; but the beautiful white cape and underparts and quieter colouring of the Lady Amherst are, perhaps, more attractive than the more gaudy plumage of the Golden Pheasant.

[Cases
11, 12.]

The true Pheasants (*Phasianus* and *Calophasis*) are, for many reasons, the most important as well as the most beautiful of all the Game-Birds. As already remarked, they are peculiar among the *Phasianinæ* in having the first flight-feather *considerably longer than the tenth*. The most familiar examples of the former genus are the Common Pheasant (*Phasianus colchicus*) (95) and the Chinese Ring-necked Pheasant (*P. torquatus*) (96). Both of these have been introduced into the greater part of Europe and Great Britain. It is not exactly known when the former, which is found wild in South-eastern Europe and Asia Minor, was first brought to England, but it is mentioned in the bills-of-fare of the Saxon kings. The Chinese species, imported at a much later date, has interbred so freely with the Common or "Old English" Pheasant, that pure-bred birds of either species are now rarely met with in this country.

About eighteen different species of *Phasianus* are found in Asia, and of these the majority resemble the Common Pheasant type in the general colour of their plumage, and a number are shewn in the Case.

The Japanese Pheasant (*P. versicolor*) (97) and Sœmmerring's Pheasant (*P. sœmmerringi*) (102), found in the same islands, are somewhat different types, while Reeves' Pheasant (*P. reevesi*) (104), from

Northern and Western China, is the giant of the genus, and remarkable for its enormously long tail, which in old males attains a length of 5 feet or even more. This grand game-bird has been introduced into various parts of Great Britain, but cannot be considered a success, for the males drive off the Common and Ring-necked Pheasant and do not interbreed freely with the females of either species. [Cases 11, 12.]

It is well known that the Pheasants found in the semi-domesticated state in this country are polygamous—that is to say, one male pairs with many females ; but there is good reason for believing that this habit has been acquired. All the evidence tends to show that in a really wild state the various species of *Phasianus* are monogamous, the cock bird remaining with the female during the period of incubation, and taking part in the duties of protecting and rearing the young. In this, as in other countries where Pheasants are reared for sport, the greater number of birds killed are cocks, and hence in the following spring there is generally a preponderance of females, which may account for the polygamous habits of introduced birds.

The Barred-backed Pheasants (*Calophasis*), of which there are two species, are represented by Elliot's Pheasant (*C. ellioti*) (105), a rare species from South-east China. The male is a particularly handsome bird, the white belly and bands across the wings contrasting with the fiery bronze-red of the rest of the plumage.

The Cheer Pheasant (*Catreus wallichi*) (106), of which only one species is known, is a crested form peculiar to the Himalaya and extending from Chamba to Central Nepal.

The Kalij Pheasants (*Gennaëus*), of which the Silver Pheasant (107) is typical, include seven well-marked species and a number of intermediate forms. They are met with in the lower and middle wooded ranges of the Himalaya, Burma, South China, and Formosa.

Considerable interest attaches to this group on account of the intermediate links found between some of the Burmo-Chinese species.

Of the Himalayan Kalij Pheasants exhibited the White-crested Kalij (108) is found from Hazara to Nepal, where the Nepal Kalij (109) takes its place ; in Sikhim and Western Bhotan the Black-backed Kalij (110) occurs ; while in Eastern Bhotan, Assam, and Northern Burma the Black-breasted Kalij (111) is the only species found. Though these four species touch in their ranges, so far as is known they *never* intergrade with one another. On the other hand, the Black-bellied Kalij and Silver Pheasant from South China are connected by the complete chain of closely allied geographical forms.

Swinhoe's Kalij (112), from the Island of Formosa, is a somewhat distinct form, and the male, as will be seen, is the handsomest of all the Kalij Pheasants.

[Case 13.] The Koklass Pheasants (*Pucrasia*) include half-a-dozen species found in various parts of the Himalaya, Tibet, and China. The males have a much longer crest than the females, and the feathers behind the ears are greatly developed, forming two long tufts surpassing the crest in length. The Common Koklass Pheasant (*P. macrolopha*) (113) is common in the Western Himalaya from Kumaon to Chamba, and generally found singly or in pairs. Its flesh is said to be superior to that of every other Hill-Pheasant.

The Fire-backed Pheasants, represented by two small groups each containing three species, are natives of the dense damp evergreen forests of the Indo-Malayan countries, Sumatra, and Borneo. Of the forms without a crest an example will be found in the Bornean Crestless Fireback (*Acomus pyronotus*) (114). The females in this genus are remarkable for their entirely black plumage and from the fact that their legs are armed with a pair of strong spurs as perfectly developed as those of the male.

Two examples of the crested form are exhibited, the Malayan Crested Fire-back (*Lophura rufa*) (115) and Diard's Fire-back (*L. diardi*) (116), both remarkably handsome species. The males are provided with a pair of strong spurs, but the females are devoid of these weapons.

The great Eared Pheasants (*Crossoptilon*) (117, 118) are inhabitants of the high wooded mountains of Tibet and China, ascending to a height of about 12,000 feet above sea-level. They are sociable in their habits, and during the autumn and winter are generally met with in large flocks. Like the Common Pheasant, they pass most of their time on the ground searching for seeds, roots, and insects, and at night roost in company on the pine-trees. The legs of the male are armed with short stout spurs, and, unlike the majority of the Pheasants, the plumage is alike in both sexes. The feathers forming the ear-coverts are much lengthened and pure white in all the five species known.

A remarkable Bornean species will be seen in Bulwer's Wattled Pheasant (*Lobiophasis bulweri*) (119). The male has the head almost devoid of feathers and ornamented with three pairs of blue wattles, and the beautiful white tail is composed of no less than 32 feathers, by far the largest number found in any Game-Bird. The female has 28 tail-feathers, or two pairs less, and the head is feathered and not ornamented with wattles. This species has only been met with in the lower mountain-forests of Sarawak, and it is essentially a ground bird, and seldom seen on the wing.

[Case 14.] Of the Moonal Pheasants (*Lophophorus*) four different species are known, all being natives of the elevated forests of the Himalaya or Western China. In all the plumage of the males is magnificent, but

that of the Common Moonal (*L. refulgens*) (120) is perhaps the handsomest. This species is found throughout the higher wooded ranges of the Himalaya, whence enormous numbers of skins were yearly imported to this country for the adornment of ladies' hats.

The splendid Horned Pheasants (*Tragopan*), commonly though incorrectly called "Argus" Pheasants by Indian sportsmen, are represented by five different species, which inhabit the higher forest-clad ranges of the Himalaya and China. The chief characteristics of the males are the fleshy horns and the gular lappet, which are conspicuous ornaments during the breeding-season, especially when the birds are excited by passion, but barely traceable during the winter.

The Crimson and Western Horned Pheasants (*T. satyra* (121) and *T. melanocephalus* (123)), are two of the handsomest species met with in the Himalaya. Though both inhabit the thick cover of the higher hills they are rarely, if ever, seen amongst the snow, and appear to shun it as much as the Blood-Pheasant delights in it.

The Blood-Pheasants (*Ithagenes*) are very handsome Alpine birds met with in the higher regions of the Himalaya, Tibet, and Western China. The males are remarkable for the pale green colour of parts of their plumage, and for the number of spurs on their legs, some individuals having as many as four pairs. The species exhibited (*I. cruentus*) (124) is met with in flocks in the higher forests of the Eastern Himalaya, at elevations varying from 10,000 to 14,000 feet, and always in the immediate neighbourhood of the snow.

Among the Partridge-like birds with the Pheasant-type of wing are the Stone-Pheasants (*Ptilopachys*) (125), represented by two African species found in rocky ground in the neighbourhood of cliffs and precipices; the Bamboo-Pheasants (*Bambusicola*), with three species, found respectively in North-east India, Southern China, and Formosa; and the Spur-Fowl (*Galloperdix*), with two Indian and one Ceylonese species.

The Chinese Bamboo-Pheasant (*Bambusicola thoracica*) (126) is a very handsome bird, resembling the Common Partridge in the general colour of its plumage, which is alike in both sexes. It inhabits the jungle-clad hills, roosting and often perching on the branches of bamboos and other trees, where it is perfectly at home.

Of the Indian *Galloperdix* an example will be found in the Painted Spur-Fowl (*G. lunulata*) (127). As may be seen, the male and female differ in plumage, and the legs of the former are armed with two and sometimes three pairs of spurs, while those of the latter have usually only one pair. Like the Bamboo-Pheasants, they are birds of the forest and jungle.

Subfamily III. *Perdicinæ*. Partridge-like Game-Birds.

As already mentioned, this subfamily includes the Old-World Partridges and Quails, which may be distinguished by the following characters:—The cutting-edge of the lower mandible is not serrated or provided with a tooth-like process. The first flight-feather is longer than or rarely equal to the tenth. In one or two of the species of Francolin it is slightly shorter, but these may at once be recognised as belonging to the *Perdicinæ* by their short tails.

The most perfect type of Partridge-wing is found in such forms as the Snow-Partridge (*Lerwa*) and the Quails (*Coturnix*, *Synæcus*, and *Excalfactoria*), in which the first flight-feather is equal to or very slightly shorter than the second, and the tenth is much the shortest. These, as might be expected, are all birds with great powers of flight.

[Case 15.] Four different species of Partridge (*Perdix*) (129–132) are known.

As considerable interest attaches to the sexual differences in plumage of the Common Partridge (*P. perdix*) (129), wings of the male and female have been exhibited to show the only reliable character for distinguishing the sexes except in very young birds. It will be seen that the lesser and median wing-coverts of the male are without the buff cross-bars so conspicuous on the feathers of the female. Young birds—that is to say birds of the year, whether male or female—may always be distinguished from old birds by having the first flight-feather *pointed* at the tip instead of *rounded*. The pointed first flight-feather, being retained till the following autumn moult, is a better character for denoting age than the colour of the feet. In the earlier part of the season the feet of young birds are yellowish-brown, but at the commencement of the hard weather they become pale bluish-grey like those of the adult.

A curious rufous variety of the Common Partridge was described by Brisson in 1760, under the name *Perdix montana* (130). That it is merely a strongly marked variety is clearly shown by the forms exhibited, which show the intermediate stages between the most typical rufous bird and the normal plumage. This chestnut phase of plumage, which occurs in birds of either sex, was first recorded from the mountains of Lorraine, where it appears to be fairly numerous. Since that date similar examples have been procured from time to time in most counties of England, notably in Northumberland, where the rufous birds were supposed by some to be hybrids between the Red Grouse and Common Partridge.

[Case 15.] The Jungle Bush-Quails (*Perdicula*) (133) and Painted Bush-Quails (*Microperdix*) (134) together include only five small species peculiar to India. They differ from the true Quails in the shape of the wing, the first flight-feather being comparatively short.

In the Quails (*Coturnix*) (135-137), of which seven different kinds are [Case 15.] known, we find the most highly-developed type of Partridge-wing, the first flight-feather being slightly shorter or equal in length to the second (see wing exhibited). All the species are more or less migratory, their movements being regulated by the changes of season, but the Common Quail (*C. coturnix*) (135) is by far the greatest wanderer of all. Though small numbers of this bird are resident and remain throughout the year in suitable localities, the majority travel thousands of miles every year, countless numbers going northwards in spring to breed, and returning south to their winter-quarters in the autumn. The Black-breasted or Rain-Quail (*C. coromandelica*) (137) is peculiar to India and the countries to the east of the Bay of Bengal, migrating during the monsoon (rainy season) from the damp low-lying districts to the drier parts of Upper and Western India. The closely allied New Zealand Quail (*C. novæ zealandiæ*), though a common bird in the early days of the Colony, is now doubtless quite extinct. A skin of this bird, and that a female, recently sold for £75.

The Swamp-Quails (*Synæcus*) (138, 139) are very closely allied to the [Case 15.] Common Quail and its allies. Van Raalten's Swamp-Quail (139) inhabits the islands of Timor and Flores, and is the handsomest of the three species known.

The smallest of all the Game-Birds are the Painted Quails (*Excalfactoria*) (140, 141). Only four tiny forms are known, the males having the plumage very beautifully coloured. As in the other Quails, the first and second quill-feathers are the longest, and the flight is extremely rapid. These little birds are remarkable in possessing only eight very short tail-feathers, or two less than any other bird of the group. The common Painted Quail (140) is plentiful enough throughout the Indo-Chinese countries, being chiefly found in open, swampy grass-lands and meadows. Of recent years it has frequently been kept in confinement in this country and breeds freely: the young, when about a week old and scarcely larger than walnuts, are able to fly, and when about six weeks old they are scarcely distinguishable in plumage from their parents.

In the Crested Wood-Partridge (*Rollulus*) (142), of which only one [Case 15.] species is known, the male has a beautiful hairy crest, and both sexes possess a tuft of long hair-like bristles on the forehead. The grass-green plumage of the female is very remarkable, this colour being almost unknown among Game-Birds, and only found elsewhere in the Blood-Pheasants (*Ithagenes*).

The Tree-Partridges (*Arboricola*) (143, 144), of which fifteen species [Case 15.] are known, inhabit the Indo-Chinese and Indo-Malayan countries and some of the adjacent islands. All the birds of this genus are peculiar

in possessing a series of small bones above the eye, known as the supra-orbital chain (see skull). The toes are provided with peculiar long, nearly straight nails. With the exception of the Common Tree-Partridge (*A. torqueola*) (143) here exhibited, the plumage is alike in both males and females. All are inhabitants of the thick jungle covering the higher hills, the common species occasionally ranging in the Outer Himalaya to an elevation of 14,000 feet above sea-level. As their name implies, these birds are given to perching on trees, especially on the approach of danger, but for the most part they live on the ground, running actively to and fro in search of insects and vegetable food. The eggs are pure white, with a fine, rather glossy shell.

[Case 15.] The Crimson-headed Wood-Partridge (*Hematortyx*) (145) is a beautiful form inhabiting the mountain-forests and jungles of North Borneo. The legs of the male are armed with two or three pairs of spurs. Other Malayan genera are the Ferruginous Wood-Partridge (*Caloperdix*) (146) and the Black Wood-Partridge (*Melanoperdix*) (147), a peculiar type worthy of special notice on account of its unusually stout and thick bill.

[Case 16.] The Red-legged Partridges (*Caccabis*) (148-151) form a small group, the members of which may be recognised by the brownish-grey tint of their upper plumage and bold handsome barring on the sides. The males and females do not differ from one another in plumage, but the former may be recognised by the stout blunt spurs on the legs. Of the six forms known, four are exhibited, including the black-headed Arabian species, the largest member of the genus (151), the Common Red-legged (149) and Barbary Partridges (150), which are the handsomest.

As will be seen on the small map showing its distribution, the Chukar (*C. chukar*) (148), so well known to sportsmen, has a very wide range. It varies immensely in size and colour in different localities, which is to be expected of a bird which occurs from sea-level to an elevation of at least 16,000 feet. The palest forms are found in such arid neighbourhoods as Bushire at the head of the Persian Gulf, while the darkest and most richly-coloured birds here exhibited inhabit the Ionian Islands, Cyprus, Asia Minor, and the outer ranges of the Himalaya where vegetation is more plentiful.

[Case 16.] In the closely allied Seesee Partridges (*Ammoperdix*) (152), the sexes differ from one another in plumage. They inhabit bare broken ground and desolate hill-sides, where their colours harmonise with their surroundings and afford them protection.

[Case 16.] The Francolins (*Francolinus*) (153-162) are a very numerous group including nearly fifty different species, five of which are Asiatic and the remainder African. With the exception of the Painted Francolin (*F. pictus*) (154), the legs of the males and, in some species of the females

also, are armed with one or more pairs of spurs. Of the species here exhibited the Common Francolin (153), formerly met with in Southern Europe, but now extinct there, is the most familiar, and known to Indian sportsmen as the *Kala titur* or Black Partridge. Another species, only found in the Terai of North India, is the Swamp-Francolin or Kyah (158). Levaillant's Francolin (156), with its chestnut flight-feathers, belongs to the group known as "Redwings," in South Africa; while the Double-spurred Francolin (160) from West Africa represents a somewhat different section of the genus. Hildebrandt's Francolin (159) is specially interesting, for the female not only differs entirely from the male in the colour of the underparts, but has the legs armed with one or two pairs of strong spurs, and was for some time regarded as representing a distinct species.

The Cape Francolin (161) and Erckel's Francolin (162) are among the largest known species, the former being well-known in South Africa as the "Cape Pheasant." A closely allied African genus *Pternistes* includes nine species of bare-throated Francolins, and an example of these will be found in Gray's Bare-throated Francolin (*P. leucoscepus*) (163).

The Snow-Partridge (*Lerwa*) (164), the sole representative of its [Case 16.] genus, is an Alpine form generally met with at elevations ranging from 10,000 to 15,000 feet above sea-level. As indicated by the shape of the wing, the Snow-Partridge is a bird of rapid and powerful flight, but, unlike the Quails, it does not appear to be migratory, merely shifting its quarters to lower elevations when driven down by severe snowstorms. The large Snow-Cocks (*Tetraogallus*) (165, 166), of which six species are known, are also Alpine birds, very similar in their habits and mode of life to the Snow-Partridges, but found at even greater elevations, the Tibetan Snow-Cock here exhibited being met with up to 19,000 feet above sea-level.

The handsome Long-billed Francolin (*Rhizothera*) (167), of which [Case 16.] only one other Bornean species is at present known, is distinguished from its allies the Francolins by the long stout curved bill and by having only twelve tail-feathers, all the latter possessing fourteen. As will be seen, the male and female of this curious Malayan form differ considerably in plumage.

FAMILY II. TETRAONIDÆ. GROUSE.

The members of this family are distinguished from the Phasianidæ (Pheasants, Partridges and Quails) by several distinctive characters. The nostrils are entirely hidden by feathers. The legs are either partially feathered as in the Hazel-hens and Ruffed

[Cases
17, 18.]

Grouse, or entirely feathered as in the Capercaillies and Black Grouse, etc., and never armed with spurs. The toes are either covered with feathers as in the Ptarmigan, or naked and pectinate, that is to say with a series of horny comb-like processes on each side, as in the Capercaillies, Black Grouse, etc.

In no group of birds are the seasonal changes of plumage more interesting and peculiar than in the Willow-Grouse, Red Grouse, and the various kinds of Ptarmigan, and therefore worthy of special notice. The seasonal changes are attained in three different ways:—(1) By moult. (2) By gradual change of pattern in the old feathers without a moult. (3) By the wearing off of the tips of the feathers. The quills and tail-feathers are only renewed once a year at the general autumn-moult, which is always the most complete.

Wild hybrids between some of the species of this family appear to be more common than among any other group of birds, possibly because they attract greater attention. In many Grouse the females which have become barren from old age or from injury to the ovary assume a plumage more or less resembling that of the male, and examples of this peculiarity are exhibited in the groups of Capercaillie and Black Grouse. More rarely the reverse obtains, and examples of males assuming the female plumage are met with.

[Case 17.] The Capercaillies (*Tetrao*), of which four European and Asiatic species are known, are the largest members of the family. The common Capercaillie (*T. urogallus*) (169), inhabiting the pine forests of Europe and Northern and Central Asia, is common in some of the eastern counties of Scotland. Hybrids between this species and the Black Grouse (170) are by no means rare, the male offspring, of which a fine example is shown, being remarkably handsome birds with a violet gloss on the breast.

[Case 17.] In the American bare-toed Grouse belonging to the genera *Dendragapus* (171), *Tympanuchus* (173), *Centrocerus* (174), and *Pediæcetes* (175, 176), of all of which examples are exhibited, the males are provided with a pair of inflatable air-sacs situated one on each side of the neck. These are not visible except when the bird is excited or showing off to the females, but at such times they can be blown out like a bladder and enable him to produce deep booming sounds which may be heard at a great distance. The stomach of the Sage-Grouse (*Centrocerus urophasianus*) (174), a native of the sage-brush plains of Western North America, differs from that of other game-birds in being soft and membranous, very different from the muscular gizzard found in all the allied forms. As its name implies, this species is seldom found far from the tracts of Sage-brush (*Artemisia*), the leaves of which form its principal food, and during the winter months, when it eats little else, its flesh is unfit for the table. The Prairie Hen (*Tympanuchus americanus*)

(173), from the prairies of the United States, remarkable for the long tuft of feathers on each side of the neck in the male, and the Sharp-tailed Grouse (*Pediæcetes phasianellus*) (175), from the wooded districts and tundras that border the British North-American lakes, are both well known American game-birds, and are occasionally forwarded in a frozen state to the London market. Another handsome North-American species is the Ruffed Grouse (*Bonasa umbellus*) (177), with a frilled ruffle of fan-shaped feathers on each side of the neck. Closely allied we have the Hazel-hens (*Tetrastes*), of which two or perhaps three species are known from Europe and Northern and Central Asia. The common Hazel-hen or Gelinotte (*T. bonasia*) (178), which inhabits the lower pine-forests and birch-woods of the mountainous districts of Europe and North and Central Asia, is greatly esteemed as an article of food, its flesh being white and delicate, and large numbers are frozen and imported from Scandinavia and Russia to the London market. Other well-known North American genera are the American Capercaillies or Dusky Grouse (*Dendragapus*) (171) and the Canadian Grouse (*Canachites*) (172), found in the dense thickets and evergreen woods of the middle and higher mountain-ranges.

The two species of Black Grouse exhibited are the only known members of the genus *Lyrurus*. Though evidently closely allied, a remarkable difference is presented in their life-history. In the male of the common Black Grouse (*L. tetrix*) (179) the young bird attains the black plumage of the adult more or less perfectly at the first autumn-moult, only a few of the feathers of the back retaining a mottled brown appearance. The young male of the Caucasian Black Grouse (*L. mlokosiewiczzi*) (180) assumes a barred plumage at the first autumn moult, most nearly resembling that of the adult female, and this is retained till the second moult or possibly longer, the young male exhibited having been shot on the 14th of May. [Case 18.]

During the heavy autumn-moult, which takes place in July and August, the old males of the common Black Grouse, commonly called Black Cock, are entirely devoid of tails and generally incapable of flying more than a few yards at most. At this season a temporary plumage like that of the female (Grey Hen) clothes the head and neck, and the throat becomes more or less white. This intermediate plumage is no doubt protective, for the black head and neck of the male are conspicuous objects, while the rufous-buff feathers with their black bars and marks harmonise perfectly with the surrounding objects and enable the defenceless birds to escape observation. The barred feathers of the head and neck are not cast and replaced by black ones till the rest of the plumage has been renewed, and the bird is once more able to fly.

Interesting wild hybrids between Black Grouse and Red Grouse

(186) and Black Grouse and Willow-Grouse (187) are exhibited, these being much rarer than the hybrid with the Capercaillie.

[Case 18.] In the circumpolar Willow-Grouse (*L. lagopus*) (188) and Ptarmigan (*L. mutus* etc.) (181-183) there are *three* distinct changes of plumage, in summer, autumn and winter in both male and female alike, the winter plumage being white in all.

The great peculiarity of the Red Grouse (*L. scoticus*) (185), and one without parallel among birds even of this genus, lies in the fact that the changes of plumage in the male and female occur at different seasons.

The *male* has no distinct summer- (nesting-) plumage, but has distinct autumn- and winter-plumages, retaining the latter throughout the breeding-season.

The *female* has a distinct summer- (nesting-) plumage, also a distinct autumn-plumage which is retained till the following spring.

To put it more concisely, both male and female have two distinct moults during the year, but in the male they occur in autumn and winter, and in the female in summer and autumn, the former having no distinct summer-, and the latter no distinct winter-plumage.

The Red Grouse is generally regarded as merely an insular form of the Willow-Grouse, and it might naturally be supposed that as the British species does not turn white in winter, such protective plumage being unnecessary in the localities it inhabits, the winter-moult had been gradually dropped. But as already shown, this is the case with the female only, and the male, for some unknown reason, changes the newly acquired buff and black autumn-plumage for a winter-garb of chestnut and black, which is retained till the following autumn.

Order II. PTEROCLETIFORMES.

Family PTEROCLIDÆ. SAND-GROUSE.

[Table-case.] This small order includes only sixteen species, intermediate in their affinities between the Pigeons and Game-Birds. The skeleton resembles that of the Pigeons in many important points, but the digestive organs are like those of the Game-Birds. The bill is very similar in shape to that of the latter, but not so strongly developed, while in the outward expression, general shape of the body, the soft and easily detached plumage, and the long pointed wings, we find a marked resemblance to the Pigeons. The feathers of the body are provided with a well-developed aftershaft. As might be expected from the shape of the wings and the great development of the pectoral muscles which work them, all the Sand-Grouse are birds with immense powers of flight, able

to traverse great distances in a remarkably short space of time. The majority are migratory, some of them wandering thousands of miles. As their name implies, they are for the most part inhabitants of the sandy-deserts, where water is generally scarce and in the dry season only to be met with at long intervals. Sand-Grouse cannot exist without water, and drink regularly in the early morning and at evening, when they visit the nearest pool in countless numbers, their powerful wings rendering distance no obstacle. The legs and toes, which are remarkably short, seem ill-adapted for walking, but the birds are perfectly at home on the ground, and can run much more easily and rapidly than might be supposed.

No nest is made, merely a slight hollow is scratched in the ground. The eggs are nearly perfectly oval in shape, double-spotted (very similar to those of the common Land-rail), and almost invariably three in number. The young, which are able to run soon after they are hatched, are covered with beautifully-patterned down, but quite different from the fluffy down of young Game-Birds, each plume of the body being distinct and almost scale-like in appearance. All the species are included in one family and are well represented in the Table-case (192-198).

Great interest attaches to Pallas's Three-toed Sand-Grouse (*Syrhaptes paradoxus*) (192), on account of its irregular migrations into Western Europe. Its true home, as may be seen on the map showing its distribution, is the Kirghiz Steppes and Central Asia, but for some unknown cause great numbers periodically visit Europe in the early summer, even penetrating to Great Britain and other islands off the western coasts. The first great visitation took place in 1863, and again in 1888 enormous numbers spread themselves over Europe and bred in various places, both eggs and young having been obtained. In other years smaller flocks have been observed, but the species has never succeeded in establishing itself permanently in Western Europe.

Order III. TURNICIFORMES.

Family TURNICIDÆ. HEMIPODES.

The Hemipodes or Bustard-Quails (*Turnicidæ*) form a family by themselves. They are small birds resembling Quails, but distinguished externally by the absence of a hind-toe, except in the Australian genus *Pedionomus* (204), and internally by many structural characters of importance. The female is always larger and more handsomely marked than the male, who undertakes the duty of hatching the eggs and caring for the young. The latter are covered with patterned down, like young wading birds, and are able to run soon after

[Table-case.]

they are hatched. The eggs, three to five in number, are double-spotted with dark purplish-brown and lilac, and are laid in a slight hollow in the ground lined with dry grass. Hemipodes are entirely birds of the Old World, and are distributed over Africa, Madagascar, India, and China, and extend throughout the Malayan Archipelago to Australia.

The Andalusian Hemipode (*Turnix sylvatica*) (199) inhabits Southern Europe and North Africa, and is said to have been met with on three occasions in the South of England. Like the rest of its allies, it is solitary in its habits, frequenting dry grassy plains and localities covered with low trees and dense bushes, where it is difficult to flush, and escapes from danger by running.

Order IV. COLUMBIFORMES. PIGEON-TRIBE.

[Cases
19 & 20.]

The birds of this large order possess so characteristic a physiognomy that they may be easily recognised at the first glance. The bill is rather slender and weak, covered at the base with a soft, more or less swollen membrane, in which the nostrils are situated. Some portion of the plumage has almost always a metallic gloss, and many of the exotic species are gorgeously coloured. The legs and toes in the typical Pigeon are short and not adapted for scratching up the ground like those of the Game-Birds, and the legs are never armed with spurs.

All the species are monogamous, and both sexes assist in building the nest, which is a loosely constructed cradle of sticks. The eggs are pure white and usually two in number, though there are many species which lay only one. The young when hatched are blind and naked, but after a little time become clothed with hairy down. They remain in the nest for many days and are entirely dependent on the care of their parents, who at first feed them with a milky fluid secreted by the crop and afterwards with moistened food.

Pigeons are found all over the world, but are most numerous in the Eastern Hemisphere, especially in the islands of the Indo-Pacific Ocean and in Australia.

About 450 species are known, and are valuable to man on account of the excellent quality of their flesh.

The species exhibited bring out very clearly three interesting points:—the evidence of adaptation to an arboreal or to a ground-dwelling life, the great contrast in size, and the wonderful range and variety of coloration.

Family I. DIDIDÆ. Dodos. (Plate II.)

No more striking illustration of adaptation to a ground-dwelling life can be found than that furnished by the Dodos (205) [Pl. II.] and their ally the Solitaire (206), both long since extinct. Remains of these now famous birds will be found in two of the Table-cases in this bay. Both these relatively gigantic Pigeons were flightless, a condition probably due to the fact that they lived on small islands uninhabited by man or other enemies, and were able to procure food in abundance without resorting to flight. As a result of this easy life the body gradually acquired a greatly increased bulk, whilst the wings gradually decreased in size, till flight at last became an impossibility.

[Table-cases & Picture in Cases 19 & 20.]

The Solitaire (*Pezophaps solitarius*) (206), though less well-known than the Dodo, was in some respects more remarkable, for the wings of the males were armed with large bony knobs, apparently used as weapons of offence. The Dodo (*Didus ineptus*) (205) inhabited Mauritius, the Réunion or White Dodo (*Didus borbonicus*) (205 a), Réunion, and the Solitaire Rodriguez, all islands in the Indian Ocean. When these islands were first discovered by Europeans both the Dodos and the Solitaire existed in large numbers, but being unable to protect themselves by flight, they were rapidly killed off for food; their extermination being accelerated by the introduction of dogs, cats, and swine. Probably by the end of the 17th century not one of these birds survived, and what we know of their external appearance is derived from a few old paintings and from skeletons. The exhibited examples of the Common and White Dodos are restorations. One of the most interesting paintings is exhibited in the adjoining Wall-case, and is a portrait from life, painted in Holland by Roelandt Savery. This picture was once the property of Sir Hans Sloane and was given by him to George Edwardes, F.R.S., who presented it to the British Museum in 1759.

Family II. DIDUNCULIDÆ. TOOTH-BILLED PIGEON.

Besides the two extinct types just mentioned, there are many other species of Pigeons which have taken to a terrestrial life, and are hence known as Ground-Pigeons. One of these is the Tooth-billed Pigeon (*Didunculus strigirostris*) (207) of Samoa, which was reported to be nearly extinct in 1863. It is now, however, said to be once more increasing, having entirely changed its habits and taken to an arboreal life. It feeds and roosts in the highest trees, and whereas it formerly laid its single egg on the ground like the Dodo, it now builds its nest in the branches. On account of its heavy bill, it bears some resemblance to the Dodo, and mainly on this account is held by some to be an ally of that extinct bird.

[Case 19.]

Family III. COLUMBIDÆ. PIGEONS.

[Cases 19, 20.] This family includes all the remaining species of the Order. Of the Ground-Pigeons exhibited we may specially mention the Giant Crowned Pigeons (*Goura*) (208, 209), the Grey-naped Ground-Pigeon (*Otidiphaps cervicalis*) (210) from New Guinea, held by some to be an ally of *Didunculus*, the Nicobar Pigeon (*Caloenas nicobarica*) (213) with its remarkable metallic plumage and long neck-hackles, the Wonga-wonga (*Leucosarcia picata*) (214) from East Australia, and the beautiful Bartlett's Blood-breasted Pigeon (*Phlogœnas crinigera*) (215) from the Philippines. In all these it will be noted that the length of the leg is very conspicuously greater than in the tree-haunting type of Pigeon.

[Case 19.] Above these will be seen the beautiful Bronze-winged Dove (*Chalcophaps indica*) (227), and the diminutive Long-tailed African Dove (*Æna capensis*) (228), one of the smallest of all the Pigeons. Next come the more familiar species belonging to the genera *Turtur* and *Columba*. Of the former the Turtle-Dove (*T. turtur*) (231) and the Eastern Turtle-Dove (*Turtur orientalis*) (231 a), which is included in the British List, may be specially mentioned, and of the latter the Stock-Dove (237), the Rock-Dove (238), and the Wood-Pigeon (239), all common species in the British Isles. The Rock-Dove is noteworthy, as from this species all the domesticated varieties have been derived. The handsome Reinwardt's Cuckoo-Dove (*Reinwardtœnas reinwardti*) (240) and the Passenger Pigeon (*Ectopistes migratorius*) (241), of Eastern North America, complete the more noticeable species in this Case. The latter species is now extinct, though only a few years ago it was met with in such countless flocks that a colony seen by the naturalist Wilson on one occasion was estimated to consist of more than 2,230 millions! As late as 1878 a "roost" of these birds, at Petosky in Michigan, occupied an area twenty-eight miles long by three or four broad. During the nesting-season millions of birds are said to have been slaughtered without producing any appreciable reduction in their numbers.

[Case 20.] Resplendent colours are characteristic of the Fruit-Pigeons, though green may be said to be the predominant tone. Some, such as the Chatham Island form (*Hemiphaga chathamensis*) (249), exhibited on the floor of this Case, are of large size, and a curious crested species, *Lopholæmus antarcticus* (248) from New South Wales, will be found near it. The Nutmeg-Pigeon (*Myristicivora bicolor*) (250) from the Malay Archipelago is a striking form, being pure white with the flight-feathers and tip of the tail black. Among the more brilliantly coloured forms are the Orange Fruit-Pigeon (*Chrysœnas victor*) (262) from the Fiji Islands, and the Jambu Fruit-Pigeon (*Ptilopus jambu*) (271) from Borneo. The Red-crowned Pigeon (*Alectrœnas pulcherrima*) (261) from the Seychelles represents a remarkable little group, one of which,

A. nitidissima of Mauritius, has become extinct within historic times. Of the Green Fruit-Pigeons *Sphenocercus* (278 c), *Osmotreron* (277), (277 a), *Treron* (276), etc., a number are exhibited at the top of the Case, and, as will be seen, the harmonious colouring of some of the smaller species is wonderfully pleasing, and renders them almost invisible among the foliage of the trees.

Order V. RALLIFORMES. RAIL-LIKE BIRDS.

The members of this Order are all adapted for a life among thick undergrowth, such as is found along the banks of rivers, swamps and pools, or among long grass in drier places. The body is laterally compressed between the closely fitting concave wings, so that the bird is enabled to glide easily and stealthily through reeds and other cover. The legs are moderately long and the toes often extremely so. In spite of their apparently weak and unprotracted flight, many are migratory, and some, such as the Corn-Crake, are capable of making very long voyages. Not a few from long disuse of their wings have lost the power of flight, and of these, it may be mentioned, several have become extinct during historic times. Rails are mostly good swimmers. The eggs are numerous, generally from seven to eleven in number and double-spotted. Of the species exhibited in this Case only the more interesting can be referred to here. [Case 22.]

Family I. RALLIDÆ. RAILS.

The true Rails may be distinguished by the absence of a horny frontal shield or plate on the forehead and of lobate webs on the toes. They are distributed all over the world, being as a rule of sombre coloration and of very retiring and partially crepuscular habits. The Water-Rail (*Rallus aquaticus*) (298) and the Corn-Crake or Land-Rail (*Crex crex*) (312) are both found in Great Britain, the former as a resident, the latter as a summer visitor from South Africa. The Spotted (316), Little (315), Carolina (313), and Baillon's Crakes (314) are also included in the British List, the former as a regular summer-visitor and partial resident. [Case 22.]

A number of large handsome Rails belong to the South American genus *Aramides* (306-308), three species of which are exhibited.

The singular Wallace's Rail (*Habroptila wallacei*) (305), from the forests of Halmahera in the Moluccas, and the Weka Rails or Woodhens (*Ocydromus*) of New Zealand, are of special interest, having entirely lost the power of flight, and are in consequence doomed ere long to extinction. The common Weka Rail (*O. australis*) (304), a rather large bird about the size of a hen, is much sought after by the Maoris, both for

[Case 22.] food and for the sake of its oil. Numerous forms allied to this genus have already become extinct, such as *Aphanapteryx* from Mauritius and *Leguatia gigantea* from Rodriguez, which is described as standing six feet in height and having a body as large as that of a Goose.

Other genera, such as the Purple Gallinules (*Porphyriola*, *Porphyrio* (329-332) and *Notornis*), are remarkable for the beauty of their plumage, the great size of their bill and frontal shield, and the length of their toes. The celebrated "Moho" (*Notornis mantelli*), one of the most interesting of the Purple Gallinules, is all but extinct. It is unable to fly, and has now entirely disappeared from the North Island of New Zealand, but in the South Island three have been obtained during the past century, one as recently as 1881, and a few may still exist in remote parts of the country. Strangely enough the species was first described by Owen from an imperfect fossil skull, and was at that time believed to be extinct. Shortly after, however, a living specimen was captured, to be followed by the others already referred to. Allen's Purple Gallinule (*P. alleni*) (329 a) has occurred once at Yarmouth. The common British Moorhen or Waterhen (*Gallinula chloropus*) (327) is nearly related to the Purple Gallinules, though its colouring is much less brilliant. The Coots (*Fulica*), of which the common Coot (*F. atra*) (334) is the best known, may be recognised from the rest of the family by the broad lobes to the toes, their feet bearing a strong resemblance to those of the Grebes. They are all good swimmers, spending the greater part of their life on the water, and the species are distributed over most of the world, though the majority belong to the South American region.

Family II. HELIORNITHIDÆ. FINFOOTS.

This family is represented by certain aberrant types undoubtedly allied to the Rails, in spite of their curiously Grebe-like form. Altogether three genera are recognised, two of which belong to the Old World and the third is confined to South America. This latter genus includes a single species of Finfoot (*Heliornis fulica*) (337). Peters's Finfoot (*Podica petersi*) (336) represents the Old World forms.

Order VI. PODICIPEDIFORMES.

Family PODICIPEDIDÆ. GREBES.

[Case 21.] The birds which constitute this Order are an extremely interesting group on account of the profound modifications which the skeleton has undergone in adaptation to the requirements of a purely aquatic life.

The bones of the hip-girdle have become elongated and laterally compressed to a remarkable degree. The thigh-bone is extremely abbreviated, so that the legs are set very far back near the hinder end of the body, a position which ensures the maximum of power when swimming, but which leaves the bird almost helpless on land. The front toes are

provided with wide lateral lobes which are united with one another at the base. The tail is inconspicuous, being a mere tuft of downy plumes. As in the Divers, the plumage of the Grebes is much handsomer during the breeding-season than it is in winter, and they are familiarly known on account of the muffs and trimmings for dresses which are made from their beautiful silvery-white breasts.

The Grebes are a nearly cosmopolitan family, though chiefly found in the temperate regions of both Hemispheres. About twenty-five species are known, all expert divers, but unlike some of the Auks and the Penguins, which use their wings in diving, Grebes propel themselves through the water by their curiously lobed toes alone.

In winter they migrate from the colder parts and are then often to be found at the sea, but they breed exclusively on fresh water, attaching their floating nest of weeds to any convenient patch of reeds. The eggs, which are from three to six in number, are bluish-white when first laid but soon become stained with brown. Five species occur in the British Isles, the Great Crested Grebe (*Podiceps cristatus*) (287) and the Dabchick (*P. fluvialis*) (279) being residents, while the Red-necked (286), Eared or Slavonian (284), and Black-necked Grebes (285) are autumn- and winter-visitors. The latter also occasionally appears in spring and summer, and is believed to have bred in Great Britain. The most remarkable is the large South American species (*P. micropterus*), which is found on Lake Titicaca in Peru, 12,645 ft. altitude, and lacks the power of flight.

Order VII. COLYMBIFORMES.

Family COLYMBIDÆ. DIVERS.

The Divers, or Loons as they are also called, present precisely similar modifications of the skeleton to those found in the Grebes. Indeed, the two orders are very generally regarded as one. Like the Grebes, they have a distinct breeding-plumage which differs conspicuously from that worn during the remainder of the year. The front toes are fully webbed, and the tail-feathers, though small, are normal. The large olive- or reddish-brown eggs spotted with black and grey are always two in number, and laid in a slight depression of the ground close to the water's edge. Though essentially formed for swimming and diving, when once on the wing they can also fly with great rapidity, but on land their movements are awkward and clumsy. [Case 21.]

Of the five species known to inhabit the Arctic and sub-Arctic portions of the Northern Hemisphere, four visit Great Britain, two, the Red-throated (290) and Black-throated Divers (291), nesting within our limits, and two, the Great Northern (293) and the White-billed Divers (292), visiting our shores in winter, the latter very rarely. In autumn they change their summer-plumage for a more sober garb,

becoming entirely white underneath. A comparison of the maps showing the distribution of the Grebes and Divers clearly indicates how the latter take the place of the former in the more northern regions.

Order VIII. SPHENISCIFORMES.

Family SPHENISCIDÆ. PENGUINS. (Plate III.)

[Central Case.] Penguins may fairly be considered to hold the same place among the Birds that the Seals do among the Mammalia. At the present time they are represented by comparatively few species, though they probably played a more important part in prehistoric times. They date back at least to the Upper Eocene, in which the gigantic New Zealand Penguin, standing over six feet high, was discovered. Their wings are modified into swimming-paddles covered with narrow scale-like feathers. Their legs are included in the skin of the body, and their large clumsy feet are placed so far back as to render their locomotion on land a somewhat difficult operation. Their home is the sea, and when diving they propel themselves solely by means of their wings, which they use alternately, while their legs are used as a rudder. They breed on the desolate rocks and islands in the Southern Ocean, where they are not often disturbed by man, and extend up to the equator (Galápagos) in the Pacific.

All the known species, seventeen in number, may be grouped into six genera. The best known are the large King-Penguins (*Aptenodytes patagonica*) (350) [Figs. *e* & *f*], which generally stand with their head and neck stretched out vertically and the tip of their beak pointed almost directly upwards. When pursued on shore they can move with considerable speed, and lying down flat on the belly, work both their legs and wings wildly to assist them in their frantic efforts to escape. Still larger birds are the Emperor-Penguins (*A. forsteri*) (351) from the Antarctic continent. Both these and the King-Penguin have a remarkable method of incubating, which is shared by male and female alike. [Table-case.] The large single egg is placed on the feet and pressed closely to a bare patch on the lower abdomen, being kept in place by a peculiar flap of thickly feathered skin. When the bird leaves the egg for feeding purposes, it is immediately taken possession of by some other Penguin. The Jackass-Penguins (*Spheniscus*) have received their name from their cry, which resembles the braying of a donkey. The nest of *S. magellanicus* (340) is a rudely constructed pile of grass-roots and other materials. The Rock-hoppers (*Catarrhactes* (343-345) [Figs. *a* & *c*] and *Megadyptes* (346) [Fig. *d*]), with shorter bills, derive their name from their curious mode of hopping from rock to rock with both feet placed together. The smallest of all are the species of *Eudyptula* (352, 352 a) [Fig. *b*], which inhabit the coasts of South Australia and New Zealand.

Order IX. PROCELLARIIFORMES. PETREL-TRIBE.

The Albatroses and Petrels bear a strong superficial resemblance to the Gulls, to which, however, they are not even remotely related. They may be distinguished by the curious shape of the nostrils, which have tubular openings, while in the Gulls these are slit-like. The various members of this Order vary greatly in size, the Albatroses, which are the largest of the Petrels, possessing a wider spread of the wing than any other known bird, while the Storm-Petrels are hardly larger than a Swallow. All are endowed with great powers of flight and have a peculiar musky odour, specially noticeable in the Giant and Fulmar Petrels. The Albatroses build a fairly substantial nest and breed in vast colonies in the open, but the great majority of Petrels deposit their single egg in holes and crevices of the rocks or in burrows, using little or no lining. The egg is dull white, often marked, especially in the smaller species, with a ring of reddish spots round the larger end. The young when hatched are covered with thick white or grey down, and are for a long time helpless and dependent on the care of their parents.

[Cases
23, 24.]

Family I. DIOMEDEIDÆ. ALBATROSES.

The Albatroses, of which three genera and about fifteen species are recognised, are the most powerful of all birds on the wing. One of the largest and best known species is the Wandering Albatros (*Diomedea exulans*) (355), which measures nearly eleven feet across the expanded wings. This bird breeds in great colonies on the high table-lands of some of the islands in the Southern Ocean, repairing there in October and building a mound of mud and grass with a slight hollow in the top. The single egg is not hatched till January, and the young is for a long time helpless and covered with thick white down, as may be seen in the young Royal Albatros (*D. regia*) (357). The immense expanse of the wings in flight is seen in the rare White-winged Albatros (*D. chionoptera*) (358) exhibited at the top of the Case. It is interesting to note that a specimen of the Black-browed Albatros (*D. melanophrys*) (356) was captured in Cambridgeshire in 1897. Other species of the family are the Yellow-nosed Albatros (*Thalassogeron chlororhynchus*) (359), and the Sooty Albatros (*Phaebetria fuliginosa*) (360).

[Case 23.]

Family II. PROCELLARIIDÆ. PETRELS.

The most aberrant of the Petrels are undoubtedly the three species included in the subfamily *Pelecanoidinæ* or Diving Petrels, which are represented by Garnot's Petrel (*Pelecanoides garnoti*) (361). Like the Little Auk (404) (Case 24), which they closely resemble in general appearance, they have a hurried flight and dive into the sea in pursuit of their prey without any interruption in the action of their wings, and emerge from beneath the surface flying. Unlike the other Petrels, they are generally found singly or in pairs and nest sporadically.

[Case 23.]

[Cases
23, 24.]

The second subfamily *Procellariinæ* includes the true Petrels. The Shearwaters (*Puffinus*) are numerous represented in all the great oceans of the world, and derive their name from their curious habit of skimming just over the surface of the waves. The Manx Shearwater (*P. anglorum*) (370) is widely distributed over British waters throughout the year, and breeds on many of the islands off the coast, while the Greater (372), Mediterranean Greater (371), Sooty (368), and Little Dusky (369) Shearwaters are visitors to our shores, the last being much the rarest.

The allied genus *Æstrelata*, including some thirty species, is interesting from the fact that three of the species have each been recorded once from Britain. Of these a specimen of the Collared Petrel (*Æ. brevipes*) (365) killed in Wales is exhibited, also Schlegel's Petrel (*Æ. neglecta*) (365 a), but the Capped Petrel (*Æ. hesitata*) is so rare that only one example exists in the Museum collection.

Bulwer's Petrel (*Bulweria bulweri*) (364), a curious sooty-black form, is common in the Madeiran waters, and has occurred once in Yorkshire and once in Sussex, where a specimen was picked up dead. The Pintado Petrel or "Cape Pigeon" (*Daption capensis*) (363), as its name implies, is numerous off the South African coast, and is well-known from its habit of accompanying ships for the sake of the scraps of food thrown over-board. Lastly we may draw attention to the beautiful Snowy Petrel (*Pagodroma nivea*) (362), a native of the icy regions of the South.

[Case 24.]

On the floor of this Case will be found the Giant Petrel or "Nelly" (*Ossifraga gigantea*) of the Southern seas, the largest of the true Petrels. Apart from its size this species is remarkable for possessing both a light (376) and a dark (377) phase of coloration, some individuals being dark brown and others almost entirely white. Examples of both types are shown. The Fulmar Petrel (*Fulmarus glacialis*) (379) is a well-known inhabitant of the seas of Arctic Europe, and nests within our limits in Scotland and the North of Ireland. Two phases of plumage are known, some examples having the under surface white, while in others these parts are grey. The Broad-billed Blue Petrel (*Prion ariel*) (380) represents a small group remarkable for the presence on each side of the bill of long lamellæ, resembling those of the Ducks. Of the small long-legged Petrels, commonly known as "Mother Carey's Chickens," and placed by some authors in a separate subfamily, *Oceanitinæ*, quite a number appear on the list of British Birds. Two, the Storm-Petrel (*Procellaria pelagica*) (381) and Leach's Fork-tailed Petrel (*Oceanodroma leucorhoa*) (382), breed on some of the islands off the west coast of Britain, while Harcourt's Storm-Petrel (*O. castro*) (383), Wilson's Storm-Petrel (*Oceanites oceanicus*) (387), and the beautiful White-breasted or Frigate-Petrel (*Pelagodroma marina*) (385) are accidental visitors to our shores.

Order X. ALCIFORMES.

Family ALCIDÆ. AUKS. (Plates IV., V.)

The Auks, Guillemots, Razor-bills and Puffins, included in this family, [Case 24.] form a group of exceptional interest on account of the modifications of structure which they have undergone to adapt them to a purely pelagic life. Though allied to the Gulls and more distantly to the Plovers, they are now superficially very different, and as in the Grebes and Divers the shape and carriage of the body are specially suited to their peculiar habits. Their distribution is confined to the coasts of the North Circumpolar region, none being found either in the tropical zone or in the Southern Hemisphere. Black and white are the predominating colours in the plumage of these birds. They breed generally on rocky cliffs and islands in enormous colonies, make no nest, and the female lays her one or, in some species, two eggs on the bare rock or, as in the case of the Puffins, in a rabbit-burrow or hole tunnelled by the birds themselves. The young are covered with down when hatched, and in their first plumage differ but little from the adult.

The smallest members of the group are the little Auks, represented on the top shelf of this case by several diminutive species. Least of these is the Minute Auk (*Simorhynchus pusillus*) (390), remarkable on account of its extremely small bill, while the Pigmy Auk (*S. pygmæus*) (391) and the Crested Auk (*S. cristatellus*) (392) have an elongate frontal crest of narrow feathers curving forward over the bill. In these species, as in their allies the Puffins, the supplementary ornamental shields on the bill are cast after the breeding-season, and the bill then appears much smaller and of a dull brown colour. The Perroquet-Auk (*Phaleris psittaculus*) (393) from the North Pacific is another curious little form, and the Unicorn Puffin (*Cerorhyncha monocerata*) (394), from the North Pacific and Bering Sea, has a peculiar horny excrescence at the base of the bill during the breeding-season.

The Common Puffin or Sea-Parrot (*Fratercula arctica*) (397) [Pl. IV.], a common British species, the Horned Puffin (*F. corniculata*) (396), and their ally the Tufted Puffin (*Lunda cirrhata*) (395), differ from all the species already mentioned in having the claw on the inner toe very strongly curved. During the breeding-season these birds have the bill brilliantly ornamented, but in autumn a remarkable moult takes place, and the coloured shields fall off, leaving the bill about half its former size. This is clearly illustrated on the tablet exhibited in the Case, where the head of the Common Puffin is shown with the recently cast shields alongside the bill.

From the coasts and islands of the North Pacific and Bering Sea

come two diminutive forms of Guillemot represented by the Ancient Auk (*Synthliborhamphus antiquus*) (389) and the Marbled Guillemot (*Brachyrhamphus marmoratus*) (398). Of the true Guillemots (*Uria*) two species, the Common Guillemot, Marrot, or Murre (*U. troile*) (402), and the Black Guillemot or Tystie (*U. grylle*) (400), are British breeding-birds; the Bridled Guillemot (*U. troile*, var *ringvia*) (401) being generally regarded as merely a variety of the former, though some consider it a distinct species. It is not nearly so numerous as the common form and always occurs in company with it. The wonderful range of colour and markings in the eggs laid by the Common Guillemot is well illustrated in the Case exhibited on the right-hand side of the staircase in the Central Hall. The set of specimens showing the seasonal changes of plumage in the Black Guillemot deserves special notice. Brünnich's Guillemot (*U. lomvia*) (403), distinguished chiefly by its stouter bill and by having the basal part of the upper mandible naked, occasionally visits our coasts as a straggler from the Arctic Ocean. Another regular winter visitor to Britain is the Little Auk or Rotche (*Alle alle*) (404). The Razor-Bill (*Alca torda*) (405) is chiefly interesting on account of its resemblance and probable relationship to the Great Auk, which will be found immediately below. The Great Auk or Gare-fowl (*Plautus impennis*) (406) [Pl. V.] is a bird of quite exceptional interest, being now extinct. As may be seen from its diminutive wings it was quite unable to fly, and its extermination was due largely, if not entirely, to the agency of man. The last colony of this bird inhabited the islands near Iceland and was finally exterminated in 1844. Specimens of this bird and its eggs are now regarded as great treasures.

Order XI. LARIFORMES. GULL-TRIBE.

[Cases
25, 26.]

The Gulls, Terns, and Skuas which make up this Order are closely allied on the one hand to the Auks and on the other to the Plovers which follow, and some zoologists regard these three groups as forming but a single Order. Superficially the Gulls bear some resemblance to the Petrels, but may readily be distinguished from the latter by their slit-like nostrils. From the Plover-tribe they may be recognised by their webbed feet, and from the Auks by their long wings and tail and by the carriage of the body, which is horizontal instead of nearly vertical.

The predominating colour in the adult birds is white, with a mantle varying in shade from grey to black. The young differ from the adults, being usually mottled with brown or black, and the nestlings are covered with beautifully patterned down. From one to four eggs are laid, usually brown or green heavily blotched and spotted with brown, black, and pale lilac.

Though most of the species are truly marine, they often wander far inland, and many breed in large colonies in the proximity of fresh water.

Family I. STERCORARIIDÆ. SKUAS.

On the floor of this Case will be found the Skuas or Parasitic Gulls, [Case 25.] mostly birds of a dusky or reddish-brown colour, and remarkable not only in possessing a "cere" or bare wax-like base to the bill, but also as regards their habits. Though apparently well adapted both for swimming and diving, they rather avoid the water, and obtain their food by destroying other birds or by robbing them of their prey.

Four species of the Great Skuas (*Megalestris*) are known, of which one, the "Bonxie" (*M. catarrhactes*) (409), from the North Atlantic, breeds in the Shetland Islands. One of the Southern forms (*M. antarctica*) (410), ranging from New Zealand to the Falkland Islands, appears to feed almost entirely on Petrels, and closely resembles some large hawk as it rapidly quarters the hill-sides in search of prey. Of the smaller long-tailed species (*Stercorarius*), Richardson's Skua (*S. crepidatus*) (411) has both dark and light phases of plumage, and nests in some of the islands off the north of Scotland; while Buffon's and the Pomatorhine Skuas (*S. parasiticus* (412) and *S. pomatorhinus* (413)) are both winter visitors to our coasts. All three breed in the high north and wander far south in winter. Their habits are very similar; they single out a Gull, Tern or Gannet well-stocked with recently caught fish, and after a hot pursuit force it to disgorge part of its booty, which is seized ere it reaches the water.

Family II. LARIDÆ. GULLS AND TERNS. (Plates VI., VII.)

The Gulls may generally be distinguished from the Terns by their strong, curved bill and square tail. Many of the larger species are almost omnivorous, feeding on small mammals, young birds, eggs, and all sorts of carrion, besides fish. They may be divided into two groups, those with a hood and those without. To the latter belong the Kittiwakes (*Rissa*), with the hind toe rudimentary or absent, of which *R. tridactyla* (414) is a common British species, and a number of the larger species of *Larus* such as the Common Gull (*L. canus*) (425), the Herring-Gull (*L. argentatus*) (424) [Pl. VI.], the Greater and Lesser Black-backed Gulls (*L. marinus* (421) and *L. fuscus* (423)), all of which breed in the British Isles; while the Glaucous and Iceland Gulls (*L. glaucus* (420), *L. leucopterus* (419)), and the Ivory Gull (*Pagophila eburnea*) (416) are occasional visitors to our coasts. Besides these a number of less familiar [Cases 25, 26.] [Case 25.]

[Case 26.] species are exhibited, one of the most noteworthy being the Pacific Gull (*Gabianus pacificus*) (417), with its remarkably stout bill; while Tschudi's (430), Hemprich's (431), and Heerman's (429) Gulls are specially interesting forms on account of their peculiar dusky coloration. The hooded Gulls comprise such species as our Black-headed Gull (*L. ridibundus*) (432), the commonest British species, and the Bonaparte's (*L. philadelphia*) (434), Mediterranean Black-headed (*L. melanocephalus*) (435), Great Hooded (*L. ichthyætus*) (436), and Little Gull (*L. minutus*) (437), all accidental visitors to Britain. In these birds the black hood is only assumed during the breeding-season, at other times the head is white or nearly so. Sabine's Gull (*Xema sabinei*) (438) and the very rare Ross' Rosy Gull (*Rhodostethia rosea*) (439) are aberrant forms; in the former the tail is forked, in the latter cuneate or wedge-shaped. Both belong to the Arctic Seas and are only stragglers to our coasts.

[Case 26.] The Terns or Sea-Swallows may be recognised by their nearly straight, pointed and comparatively slender bill, forked tail, and more slender build. Specially interesting forms are the White Tern (*Gygis candida*) (440) and the Noddy (*Anous stolidus*) (443), with its curious nest of mud and seaweed, etc. placed on the bough of a tree. This bird has twice been recorded from our shores. In the British Islands five species of Tern (*Sterna*), viz.: the Common (*S. fluviatilis*) (452), Arctic (*S. macrura*) (453), Little (*S. minuta*) (448), Sandwich (*S. cantiaea*) (455) [Pl. VII.], and Roseate (*S. dougalli*) (454), are regular summer visitors and remain to breed, the last being very much the rarest. Besides these, seven other species of Tern have been recorded as accidental visitors, viz.: the Sooty (*S. fuliginosa*) (446), Bridled (*S. anæsthesia*) (447), Caspian (*Hydroprogne caspia*) (456), Gull-billed (*Gelochelidon anglica*) (457), White-winged (*Hydrochelidon leucoptera*) (458), Whiskered (*H. hybrida*) (459), and Black (*H. nigra*) (460). All these are represented in the Case, and the last-named may be considered a regular visitor and formerly bred in England.

The most remarkable members of the family are the Scissor-billed Terns, of which an example will be found in *Rhynchops flavirostris* (462). They have been given their trivial name on account of the peculiar form of the bill, which is quite unique among birds. Both upper and lower mandibles are compressed to a knife-like thinness, and the lower is produced beyond the upper for a considerable distance. This peculiar modification appears to be for the purpose of catching fishes from among the surface-swimming shoals. The lower jaw being used as a sort of plough, catches up the prey as the bird flies along over the surface. Five species are known, of which one is Asiatic, one African, and three are American.

Order XII. CHARADRIIFORMES. PLOVER-TRIBE.

The birds included in this Order present great variety in size, shape and coloration, and it is interesting to notice that these differences are generally traceable to peculiar methods of feeding. Though a few species frequent arid plains, they are essentially birds of the fen and of the sea-shore, or haunt the banks of streams and desolate marshes, feeding on worms, small shell-fish, and crustacea. For the capture of these the beak and legs have become modified in many ways. A considerable number of species exhibit conspicuous changes in the coloration of the plumage, adopting a distinct summer and winter dress ; others undergo but little seasonal change. The richly coloured eggs do not ordinarily exceed four in number, and are deposited in a slight hollow in the ground with little or no preparation in the form of a nest. The young are quite active when hatched and are clothed in a thick covering of beautifully patterned down, the colour of which is more or less determined by the surroundings amid which they are hatched. [Cases 27-30.]

Family I. DROMADIDÆ. CRAB-PLOVERS.

On the floor of this Case, on the right-hand side, we find the sole representative of this very aberrant and remarkable family, which inhabits the coast-land and sandy islands of India, Arabia and East Africa. The nesting habits differ entirely from those of every other member of this order, for the Crab-plover (*Dromas ardeola*) (463) breeds in deep burrows excavated in the sand-hills and lays a single large white egg. The young are covered with greyish down and, like young petrels, remain in the burrows during the day. [Case 27.]

Family II. CHIONIDIDÆ. SHEATHBILLS.

The Sheathbills, of which three species are known, form another very aberrant family, inhabiting the islands adjacent to the southern extremity of South America and in the South Atlantic Ocean. The base of the bill is covered with a saddle-shaped horny sheath, the cheeks are naked, covered with wattles in *Chionis alba* (464), and the wings are armed with spurs. The habits of the Lesser Sheathbill (*Chionarchus minor*) (465) are described as resembling in some respects those of Pigeons, while in their gait and flight they closely resemble Ptarmigan. The rough nest of dried plant-stems is made in a hollow among the rocks or occasionally in a Petrel's burrow, and contains two or three eggs thickly spotted and mottled with purplish-red. [Case 27.]

Family III. ATTAGIDÆ. SEED-SNIPES.

[Case 27.] This is another aberrant group of the Plover-tribe, peculiar to South America. Two distinct genera are recognised, each of which is represented in the Case. Gay's Seed-Snipe (*Attagis gayi*) (466) and D'Orbigny's Seed-Snipe (*Thinocorus orbignianus*) (467) are both remarkably unlike Plovers, the former especially bearing a marked resemblance to the Tinamous.

Family IV. CHARADRIIDÆ. PLOVERS. (Plate VIII.)

[Cases
27, 28.]

To this very large family belong all the Snipes, Sandpipers, and Plovers. They may be divided into several subfamilies. The first (*Phalaropinae*) includes the little Phalaropes, which inhabit the Arctic and Sub-polar regions; they are extremely interesting birds, and the most aquatic members of the Plover-tribe. As in the Grebes and Coots the toes are lobed, and they are able to swim with ease and spend much of their time on the water. The female is larger and more handsomely coloured than the male, who undertakes the duties of incubation and the care of the young. The Red-necked Phalarope (*Phalaropus hyperboreus*) (470) annually visits the British Islands, and still breeds on some of the islets off the north and west coasts; but the Grey Phalarope (*Crymophilus fulicarius*) (469) is only an irregular visitor to our shores, while Wilson's Phalarope (*Steganopus tricolor*) (468) is a North American species. The great difference between the summer and winter plumage of these birds is worth noting.

A precisely similar reversal of the sexual characters is found in the Painted Snipe (*Rostratula capensis*) (472), examples of which may be seen on the shelf above. Generally these birds are regarded as true Snipe, but they are probably more nearly allied to the Sandpipers. Three species are recognised, and occur in Africa and Southern Asia, Australia, and South America respectively.

We now come to the true Snipe and Woodcocks, a cosmopolitan group migratory in cold climates, distinguished by the peculiar roundness of the cranium, which brings the aperture of the ear directly under the eye, and by the great length of the bill. The mottled plumage is protective in character, harmonising with the bird's surroundings and thus concealing it from enemies. The long bill is well supplied with nerves and extremely sensitive to touch, and like that of many of the Sandpipers is very flexible, especially at the tip. The Common Snipe (*Gallinago gallinago*) (476) and the Woodcock (*Scolopax rusticula*) (471) are both well-known British species, breeding throughout the Islands; while the Great, Double, or Solitary Snipe (*Gallinago major*) (477) and

the Jack Snipe (*Limnocryptes gallinula*) (473) are winter visitors, the former, however, being comparatively rare.

The next subfamily, *Totaniæ*, occupying the remainder of Case 27 [Cases 27, 28.] and the floor of Case 28, includes the Sandpipers and Godwits, most of which have distinct summer- and winter-plumages, as well as the Curlews. Of these the Dunlin (486), Ruff (500), Greenshank (496), Redshank (506), Common Sandpiper (502), Curlew (519), and Whimbrel (516) breed in the British Isles, though the Ruff and Whimbrel are local and rare. Many others, such as the Knot (484), Curlew- (483), Purple (482), Wood- (499) and Green (497) Sandpipers, Little Stint (488), Sanderling (491), Spotted Redshank (507), and the Bar-tailed (509) and Black-tailed Godwits (508) visit our coasts regularly; while among the occasional visitors are the Broad-billed (485), American Pectoral (481), Bonaparte's (480), Baird's (480 a), Buff-breasted (493), Bartram's (494), Solitary (498), and Snipe-billed or Red-breasted (511) Sandpipers, the American (487) and Temminck's (489) Stints, Spotted Sandpiper (501), Yellowshank (503), Marsh Sandpiper (504), and Eskimo Curlew (513).

Among the typical Sandpipers, perhaps the most striking form on account of its remarkable bill, is the little Spoon-billed Sandpiper (*Eurynorhynchus pygmaeus*) (490), a native of Eastern Asia. As regards variety of colour the polygamous Ruff (*Pavoncella pugnax*) (500) is quite peculiar. During the breeding-season the face of the male becomes covered with small yellow warts, the fore-neck develops an enormous "ruff" of feathers which can be erected or depressed at will, and the head is adorned with tufts of feathers or "ears" which are also erectile. Both "ruff" and "ear-tufts" are specially remarkable for the range of their colour, which may be white, rufous, or black, with or without bars, the variation being endless and alike in no two individuals. In winter both sexes are very similar in plumage, but the female, commonly called the Reeve, may always be distinguished from the male by her smaller size. The Ruff is polygamous, and the males during the spring are very pugnacious, and have a curious habit of assembling in small parties to contend in a kind of tournament for the possession of the females, which are said to outnumber them.

The difference between the summer- and winter-dress of the Godwits (*Limosa*) (508-510) is most conspicuous; in the former bright chestnut-red is the dominant colour, while in the latter the general tone is grey and white. In the Curlews (*Numenius*) (513-519) these seasonal differences are very slight.

The Ibis-billed Curlew (*Ibidorhynchus struthersi*) (520), from the [Case 28.] inland streams of Central Asia, China, and the Himalaya, is the unique type of the next subfamily, and worthy of special notice. It is more nearly allied to the Oyster-catchers than the Curlews and resembles the former in its habits.

Of the *Arenariinæ*, the Turnstone (*Arenaria interpres*) (522), one of the commonest of our shore birds, is almost cosmopolitan in its range, nesting in the Arctic regions of both Hemispheres and ranging south almost as far as land extends. It gains its trivial name of "Turnstone" from its habit of turning over stones to secure the small crustacea hiding beneath them.

The Oyster-catchers or "Sea-Pies" (*Hæmatopodinæ*) (523-525), which have the legs reticulated both in front and behind, derive their name from their supposed habit of feeding on oysters. They live, however, chiefly on mussels, whelks, and other shellfish, which are scooped from their shells by the bird's powerful bill. The common Oyster-catcher (*Hæmatopus ostralegus*) (525) is a familiar British species, breeding on the shores and sandy beds of rivers, and depositing its eggs in a slight depression in the ground. As will be seen from the specimen of *H. unicolor* (523) in the Case, some species are entirely black.

Passing over the *Peltohyatinæ*, which includes only the Australian Dotterel (*Peltohyas australis*) (533), we come to the True Plovers (*Charadriinæ*) which include a number of well-known forms, many of which are found on the List of British Birds.

Commencing on the right-hand side of the fifth shelf we find the very singular Wry-billed Plover (*Anarhynchus frontalis*) (532) of New Zealand, which has the bill twisted towards the right, an adaptation which enables the bird to pick up insects hiding under stones.

The Ringed (527) and Kentish (529) Plovers [Pl. VIII.], Dotterel (535), Golden Plover (546), and Lapwing (544), are all well-known British birds and breed in our islands; the Little Ringed (528) and Grey Plovers (541) are regular visitors on migration, and the Killdeer (534), Caspian (537), and American Golden (547) Plovers are occasional stragglers to our shores. The Dotterel (*Eudromias morinellus*) (535), one of the most beautiful of the Plovers, was at one time a tolerably common British bird, but its numbers have greatly decreased of recent years. The Grey Plover (*Squatarola helvetica*) (541) and the Golden Plover (*Charadrius pluvialis*) (546) are conspicuous for the marked changes of plumage during the summer and winter months. The Lapwing, Peewit, or Green Plover (*Vanellus vanellus*) (544) is perhaps the best known bird of the group on account of its eggs being so highly prized as table-delicacies. The young of this species (545) exhibited in the Case show the protective nature of the colour in the nestling down.

[Case 28.] A number of the Plovers have the sides of the face in front of the eye ornamented by brightly coloured wattles, which hang down on each side of the bill, and some have a strong spur situated at the bend of the wing and used as a formidable weapon of offence. As an example of those with facial wattles only, we may draw attention to the Crested-

Wattled Lapwing (*Sarciophorus tectus*) (555). In the Black-thighed (*Xiphidiopterus cucullatus*) (542) and Latham's Wattled Lapwing (*Lobivanellus lobatus*) (548), both wattles and spurs to the wings are found; while others, such as the Cayenne Lapwing (*Belonopterus cayennensis*) (554) and the Egyptian Spur-winged Lapwing (*Hoplopterus spinosus*) (543), have spurs only. The latter species is believed by some to be the "Crocodile-Bird" of the earlier writers, and is said to enter the mouths of Crocodiles to feed on the parasites attached to the gums. The Sociable Plover (*Chætusia gregaria*) (552), which ranges from South-eastern Europe and North-east Africa to Central Asia and India, is interesting to British ornithologists as having been captured three times in Lancashire.

The Avocets and Stilts (*Himantopodinae*) (557-562), which complete [Case 28.] the series in this Case, are singularly interesting types, the former especially so on account of the form of the bill, which is upturned and drawn out into an extremely fine point. The common Avocet (*Recurvirostra avocetta*) (561) at one time bred in considerable numbers in the fen-country in the east of England, but now occurs only as a visitor on migration. The Banded Avocet (*Cladorhynchus leucocephalus*) (560) of Australia, a remarkably handsome bird, represents an intermediate form with the bill but slightly curved upwards and the feet partially webbed. The Stilts have remarkably long legs and a straight slender bill and obtain their food by wading. The Black-winged Stilt (*Himantopus himantopus*) (557) has visited Britain on many occasions, and is widely distributed over Europe, Africa, and Asia.

FAMILY V. CURSORIIDÆ. COURSERS.

This small group of Plover-like birds inhabits Africa and ranges [Case 29.] through Southern Asia to India and Ceylon. One species, the Cream-coloured Courser (*Cursorius gallicus*) (564), breeds in the Canary Islands and occasionally wanders to England. It frequents dry sandy plains and deserts, running with extraordinary speed and rarely taking wing, though at times its flight is protracted. Insects such as grasshoppers form its principal food, and its eggs, two in number, are deposited on the bare ground, which they closely resemble in colour. An allied genus is represented by the Two-banded Courser (*Rhinoptilus biceinctus*) (565). One of the most interesting species is the Black-headed Plover (*Pluvianus ægyptius*) (563), also known as the "Crocodile-Bird." Like the Egyptian Spur-winged Lapwing it is said to enter the mouths of Crocodiles in search of leeches and other parasites which adhere to the great reptile's gums.

Family VI. GLAREOLIDÆ. PRATINCOLES.

[Case 29.] The members of this family are all confined to the Old World, and in general appearance bear little resemblance to Plovers. In their long wings, mode of flight, and general appearance they recall the Terns, while on account of their wide gape and from the fact that much of their time is spent in hawking insects on the wing like Swallows, they were actually placed with that group by Linnæus. In the genus *Glareola*, which includes the Common Pratincole (*G. pratincola*) (567), the tail is deeply forked, but in the allied genus *Galactochrysea* (569-570) it is either emarginate or square. The Common Pratincole occasionally wanders to Britain on migration, and the Black-winged Pratincole (*G. melanoptera*) (568) has also occurred on the coast of Kent.

A remarkable long-legged form, *Stiltia isabella* (566), has the first flight-feather greatly lengthened and attenuated towards the tip.

Family VII. PARRIDÆ. JACANAS.

[Case 29.] The Jacanas closely resemble some of the Rails, but are nevertheless more nearly allied to the Plovers. They are specially remarkable for the great length of the toes and claws, the latter being enormously elongated. Their widely spreading but extremely light feet enable these birds to walk with ease over the leaves of water-lilies and other floating herbage. All the species have the wing armed with a spur placed at the bend of the wing, but in some this weapon is long and very sharp, while in others it is blunt and much less developed. Some, such as the Australian Jacana (*Hydrelator gallinaceus*) (576) and the common South American species (*Jacana jacana*) (574), have conspicuous fleshy wattles round the base of the bill. With the latter species three very beautiful nestlings are exhibited. The largest species is the Pheasant-tailed Jacana (*Hydrophasianus chirurgus*) (577) of India and the countries to the east, while the smallest form is the little African species (*Microparra capensis*) (575).

Family VIII. ŒDICNEMIDÆ. STONE-POVERS.

[Case 29.] The Thick-knees, known also as Stone-Curlews and Stone-Plovers, are allied to the Plovers, and form a connecting link between them and the Bustard with which they are here associated. About twelve species, grouped in three genera, are found throughout the temperate and tropical portions of the Old World and in Central and South America. The Common Stone-Curlew, Thick-knee, or Norfolk Plover (*Œdicnemus œdicnemus*) (578), ranging from South and Central Europe to N. Africa and India, is a summer-visitor to many parts of England and resident

in the south-western counties, the open wolds and shingly parts of the coast being its favourite resorts. The eggs, usually two in number, are laid on the bare ground, often among stones which they closely resemble in colour. As is indicated by their large eyes these birds are to a great extent nocturnal in their habits, and they are of service to man in destroying numbers of slugs, beetles, field-mice, &c. Representatives of the other genera will be found in the Australian Thick-knee (*Burhinus grallarius*) (580) and the Large-billed Thick-knee (*Orthorhamphus magnirostris*) (579), which range from the Malay Archipelago to the shores of Australia.

Family IX. OTIDIDÆ. BUSTARDS. (Plate IX.)

The Bustards are an Old World group of heavily-built birds, and are represented by numerous species presenting great variation in size. [Cases 29, 30.] All are inhabitants of the plains and deserts, and their stout legs and short thick toes, recalling those of the Ostrich-tribe, enable them to walk and run with great rapidity. In spite of their large, somewhat clumsy bodies, their flight is often rapid and prolonged, and three species occasionally visit Britain during the colder half of the year. Of these the Great Bustard (*Otis tarda*) (585) [Pl. IX.] was formerly an abundant resident on the extensive downs and plains of England, but has long since disappeared, except as an occasional visitor; while the Little Bustard (*Tetrax tetrax*) (583) and the Houbara or Macqueen's Bustard (*Houbara macqueeni*) (589) are stragglers, the latter having occurred on three occasions only. When courting the female, the male of the Great Bustard has an extraordinary method of showing off, and when at the height of his display presents one of the most curious sights imaginable. The tail is turned up and laid flat on the back, being kept in position by the long flight-feathers of the wings which are crossed above it; the pure white under-tail-coverts, inner secondary quills, and wing-coverts are then fully exposed and ruffled up so as to form a frill covering the entire back. At the same time the head is laid back between the shoulders, and by filling a specially developed pouch with air the neck is enormously inflated till only the crown of the head and ends of the long "whiskers" are visible. In this extraordinary posture the bird struts slowly in front of the female, springing round from time to time to exhibit the white under-tail-coverts. In the Case in the centre of this bay, the appearance of the Great Bustard while engaged in his love-display has been admirably reproduced by Mr. G. Pickhardt. On the floor of Case 29 the size and position of the inflatable neck-pouch will be seen in the dissection made from a specimen which died in the Zoological Gardens during the mating-season. It is not known whether

[Central Case.]

this pouch is retained in adult birds throughout the year or developed afresh each season. A female of the Great Bustard with her downy nestlings may be seen on the floor of Case 29.

The largest of all is the Paauw or Kori Bustard (*Eupodotis kori*) (592), from the plains of Africa; and among the forms characterised by ornamental plumes on the crown and neck we may draw attention to Macqueen's Bustard already mentioned above, and the Lesser Florican or Likh (*Sypheotis aurita*) (588), which is further remarkable for its acuminate flight-feathers.

Order XIII. OPISTHOCOMIFORMES.

Family OPISTHOCOMIDÆ. HOATZIN. (Plate X.)

[Table-case in window of Bay.]

The singular South American bird known as the Hoatzin (*Opisthocomus hoazin*) (594) is the only representative of this Order, and has been referred by different naturalists to the Game-Birds and other groups. In spite of its external resemblance to the Guans, it is perhaps more nearly allied to the Rails, while certain points of structure seem to indicate considerable affinity to the Cuckoos. It inhabits the banks of the Amazon and other great South American rivers, extending as far south as Bolivia. The skeleton presents many remarkable modifications, the sternum being unlike that of any other species of bird. The keel is much reduced and its posterior termination is flattened-out into a broadened surface which supports the greater part of the weight of the body when the bird is at rest. The enormous size of the crop has probably caused the curious modifications which the furcula, sternum, and pectoral muscles have undergone. The food consists of leaves and fruit, and the birds after death have a very unpleasant odour which prevents them being used as food. In spite of their large wings the flight of these birds is very feeble and awkward, and when disturbed they only fly for a very short distance. The nestlings, which can both see and crawl soon after they are hatched, have a well-developed claw on the pollex and index fingers of the wings by means of which they creep about among the branches assisted by the bill and feet. They can also swim and dive well. The nest, a loose platform of spiny twigs, is placed on branches overhanging the water, and the eggs closely resemble those laid by the Corn-Crake and other Rails.

Order XIV. GRUIFORMES. CRANE-LIKE BIRDS.

[Cases 31, 32.]

This Order includes the Cranes and a number of allied but somewhat aberrant forms. In general external appearance they resemble

the Storks and Herons, but structurally they are very different. For instance, the nostrils in all Cranes (except the aberrant Kagu) are pervious, communicating freely with one another, and not separated by a bony partition (see p. 144), and the palate is schizognathous—that is to say, the maxillo-palatine bones are not united with one another or with the vomer (p. 145). The young are hatched covered with down, and are able to take care of themselves soon after leaving the egg.

Family I. ARAMIDÆ. LIMPKINS.

The Limpkins (598), including two American species, variously [Case 31.] known as the Clucking Hen, Caran, Courlan, Lamenting Bird, or Crazy Widow, on account of their oft-repeated piercing cry, are large long-billed birds forming a link between the Cranes and Rails. Osteologically they are most nearly related to the former, but in their external appearance, flight, and mode of life they resemble the latter. The South-American Limpkin (*Aramus scolopaceus*) (598) ranges over a large part of that continent, frequenting the beds of streams and marshes. The nest, which is placed among the rushes, contains ten or twelve Rail-like eggs.

Family II. RHINOCHETIDÆ. KAGUS.

The only representative of this family is the Kagu (*Rhinochetus jubatus*) (600), a native of New Caledonia. The shape of the bill and crest give the bird a Heron-like appearance, which is emphasised by the grey-coloured plumage. In a wild state its habits are said to be nocturnal; but in captivity it is active enough during the daytime, and exhibits considerable Crane-like dancing-powers.

Family III. EURYPYGIDÆ. SUN-BITTERNS. (Plate XI.)

These remarkable Rail-like birds are confined to Central and South America. They resemble the Kagus in many points of structure and in being provided with powder-down patches. Only two species are known, and both possess remarkably handsome and variegated plumage. The species exhibited (*Eurypyga major*) (599) is a native of Central America and Colombia. It is mounted, with outspread wings, in a position the bird is fond of assuming. The nest is placed in a tree, and the nestlings, though covered with down, have to be fed by the parents for some time before they can leave the nest.

Family IV. CARIAMIDÆ. CARIAMAS. (Pl. XII. fig. 1.)

- [Case 31.] The position of these birds in the Avian system has given rise to much discussion. Some authors have placed them in the *Accipitres*, near the Secretary-bird, which they resemble in general appearance and in certain habits; but the most recent work of anatomists seems to show that their proper position is with the Cranes. The Brazilian Cariama (*Cariama cristata*) (596) is a native of South-eastern Brazil, living on the ground among the high grasses of the campos, where its loud screaming cry may frequently be heard. The nest is placed on low bushes, and the eggs are rounded and spotted like those of Cranes and Rails. Like the Secretary-birds, it kills its prey, such as rats, by striking down on them with its feet and reducing them to pulp.

Family V. PSOPHIIDÆ. TRUMPETERS.

- [Case 31.] The Trumpeters, an example of which will be found in the common form (*Psophia crepitans*) (595), include about half a dozen species, all confined to South America. Their popular name is derived from their curious trumpet-like call, which is probably produced by means of the enormously developed trachea. Their favourite haunts are the moist forests, where, being extremely sociable birds, they are generally met with in flocks. The powers of flight are small, and being easily tamed, they are often to be seen in the settlements of the Indians in a domesticated condition. The nest is placed on the ground, and the eggs, unlike those of the other members of the Order, are white.

Family VI. GRUIDÆ. CRANES.

- [Cases 31, 32.] The true Cranes are long-necked, long-legged, stately birds, generally with bright patches of colour on the head, and with the inner secondary flight-feathers developed into drooping ornamental plumes. They are found in all parts of the world except South America. The characteristic cry is a very loud trumpeting sound, uttered with the head thrown back and the bill open, and produced by a peculiar convolution of the windpipe within the hollow keel of the breast-bone. The length and development of these convolutions depend on age, and they are entirely absent in very young birds. In the Crowned Cranes (*Balearica*) the windpipe is simple and does not enter the breast-bone.

Cranes are gregarious, and during their migrations travel in single file or in V-shaped array, after the manner of wild Geese; they frequent marshes and plains, and are specially fond of the neighbourhood of lagoons and fields of rice and corn. Their peculiar habit of dancing and going through various graceful antics may be witnessed any day at

the Zoological Gardens. Of the eighteen different species known, typical examples will be found exhibited. Of these we may call attention to the Common Crane (*Grus grus*) (601), a regular summer-visitor to Europe, the Sarus Cranes (*Antigone*), of which *A. sharpei* (605) is common in Burma and *A. australasiana* (604) is well-known in Australia as the "Native Companion," and the great African Wattled Crane (*Bugeranus carunculatus*) (606). Two very elegant forms are the Stanley's Crane (*Tetrapteryx paradisea*) (608) and the Demoiselle (*Anthropoides virgo*) (609); but perhaps the most striking are the Crowned Cranes (*Balearica*) (610, 611), with their curious brush-like crests. The eggs, two or sometimes three in number, are laid in a more or less extensive nest placed on the ground.

Order XV. ARDEIFORMES. HERON-TRIBE.

The Herons, Storks, and Ibises included in this Order differ from the Cranes in possessing a bridged or desmognathous palate (see p. 145), while their young are hatched in a helpless condition and have to be fed in the nest for a considerable period. [Cases 33, 34.]

In the true Herons the bill is almost always long, straight, pointed, often serrated on the edges, and specially adapted for the capture of fish, while the legs and toes are long and suitable for wading. In spite of their structure, apparently so unsuited for an arboreal life, they perch readily on trees, and many species build their loosely-constructed nests of sticks among the branches, either singly or in colonies.

In flight the head is drawn back between the shoulders. Many of the species assume ornamental plumage during the nesting-season, either in the form of long crest-feathers or elongate plumes on the breast or back. It is from the long "dorsal train" of the Little Egret (*Garzetta garzetta*) (642), the Snowy Egret (*Garzetta candidissima*), and the American Egret (*Herodias egretta*), as well as from other allied species [see Pl. XIII.], that the ornamental plumes known among dealers as "Ospreys" are procured.

The majority of the Herons lay eggs of a beautiful greenish-blue colour, but those of many of the Bitterns are white or yellowish-brown.

Family I. ARDEIDÆ. HERONS. (Plates XIII., XIV.)

The Bitterns (*Botaurus*), of which examples will be found on the floor of Case 33, are seldom found far from marshes; their flight is laboured and slow, but they can run and climb among the water-plants with surprising ease. They frequently attempt to conceal themselves by assuming an upright position with the bill held vertically, [Cases 33, 34.]

and their buff-striped breast turned towards the spectator. In this position they so closely resemble the surrounding reeds that they easily escape detection. The visitor's attention is directed to the Little Bittern (*Ardetta minuta*) (622) [Plate XIV.], which has been mounted to illustrate this marvellous instinct of self-preservation. Owing to the draining of the extensive reed-swamps and constant persecution the Common Bittern (*B. stellaris*) (615) ceased to breed in this country, though it continued as a winter-visitor in small numbers. Now, thanks to protection, a few pairs nest annually in East Anglia, and its booming cry is again to be heard across the fens. The American Bittern (*Botaurus lentiginosus*) (613) is an occasional visitor to our shores.

Passing by the handsome Asiatic Bitterns (*Dupetor*) (617), the Buff-backed Heron (*Bubulcus lucidus*) (621), and the Squacco Heron (*Ardeola ralloides*) (620), we come to the Tiger-Bitterns (626-628), very handsome birds represented by several genera, and the Green Herons (*Butorides*) (632-634), which form a connecting link between the Bitterns and Herons.

[Case 34.] A very remarkable type with wide, shoe-shaped bill will be found in the Central American Boatbill (*Cancroma*) (629), a bird of nocturnal habits. On the floor of the next Case several species of the nearly allied Night-Herons (*Nycticorax*) (637-639) are exhibited, of which the chestnut-backed species are the most handsome, and the common grey species (*N. nycticorax*) (639) is an almost annual visitor to our shores. The Reef-Herons (*Demigretta*) (645) are noteworthy as possessing two phases of plumage—a white form and a grey one. The same phenomenon is exhibited in the Blue Heron (*Florida cærulea*) (647) and in the Reddish Egret (*Dichromanassa rufa*) (648), where one form of the species is white and the other rufous. One of the most graceful and elegant species is the Great White Heron (*Herodias alba*) (648), which ranges over a large part of the Old World. As already stated, it is from Herons and Egrets [Plate XIII.] in their nuptial plumage that the ornamental plumes known as “ospreys” are procured.

Passing by the handsome Purple Heron (*Phoyx purpurea*) (650), we may specially draw attention to the Great Heron (*Ardea goliath*) (651), which, as its name implies, is the giant of the group; and, most familiar of all, the Common Heron (*A. cinerea*) (652). Heronries, as the colonies of nests are called, are found in many parts of Great Britain and Ireland. After the breeding-season is over, the majority of the birds disperse over the country. Many go down to the coasts and remain away during the autumn and winter, only returning in spring, but, if the season is a mild one, they begin to lay in the beginning of March or even earlier. Their appetite is insatiable, and they destroy large numbers of fish, frogs, young water-fowl, and even water-rats.

The Storks, which form the next section of this order, include several families represented by some remarkable forms.

Family II. BALÆNICIPITIDÆ. SHOE-BILLED STORKS.

The Whale-headed Stork or Shoe-bill (*Balæniceps rex*) (654) is [Case 35.] certainly the most striking and extraordinary of all the Storks. It is confined to the marsh-countries of the Upper Nile, and thence ranges southwards through the great system of lakes as far south as Nyasa. Though it perches freely on trees, it places its nest in the reeds or high grass immediately on the water's edge. Its principal food consists of fish and reptiles, and its strongly hooked bill seems specially adapted to seize and rip open turtles and the mailed fishes with which the waters of Central Africa abound.

Family III. SCOPIDÆ. HAMMER-HEAD STORKS.

The Hammer-head (*Scopus umbretta*) (655), as in the preceding [Case 35.] instance, is the sole representative of a distinct family, which inhabits Madagascar and a large part of the Ethiopian Region. It frequents wooded districts, and is generally met with in pairs. The nesting-habits are remarkable, for the birds build an enormous structure of sticks lined with roots and clay, with an entrance in the side and usually a flat top. This mass, sometimes amounting to quite a cart-load, is placed either on a tree or rock, and contains from three to five white eggs.

Family IV. CICONIIDÆ. STORKS.

A number of genera are included in the true Storks. On the ground-floor of the Case the visitor will find the ungainly and rather repulsive looking Adjutant (*Leptoptilus dubius*) (656), with its bare pinkish-red head and neck and pendulous pouch, which can be inflated at will and is apparently merely ornamental. This species and its two close allies all possess the beautiful soft under tail-coverts known as "Marabou" feathers, which are in demand for purposes of millinery. In India this bird is protected on account of its utility as a scavenger, and may often be seen in the streets of the towns, devouring carrion and fearless alike of man and dog. [Cases 35, 36.]

The genus *Ciconia* is represented by the White Stork (*C. alba*) (657) and the Black Stork (*C. nigra*) (658), both of which are occasional stragglers to Great Britain. As in their allies, the absence of the so-called "intrinsic muscles" deprives them of voice, and the only sound they can produce is a loud clatter made by beating the mandibles rapidly together. If flying, they hold the neck straight forward like

the Hammer-head, and may thus always be distinguished on the wing from Herons. Many of the species are migratory, the common White Stork being a summer-visitor to Europe, where it is carefully protected and encouraged to build its nests on the houses and in the gardens.

A very large and striking species is the Saddle-billed Stork (*Ephippiorhynchus senegalensis*) (659), which inhabits Tropical Africa; and no less handsome in their way are the Black-necked Jabiru (*Xenorhynchus*) (660) and its American ally (*Mycteria*) (661). The Open-billed or Shell-Storks (*Anastomus*) (664, 665) are remarkable for their nut-cracker-like bill, so well adapted for breaking open molluscs, which form their principal food. The peculiar gap in the bill is not seen in the young, but seems to develop as the birds get older.

[Case 35.] Passing over the White-necked Stork (*Dissura microscelis*) (663), with its curiously deeply-forked tail, and the White-bellied Stork (*Abdimia abdimii*) (662), which looks like a miniature Black Stork, we come last to the Wood-Ibises, a somewhat isolated group, of which an example will be found in the beautiful African species (*Pseudotantalus ibis*) (666), with its striking white, black, and dull crimson plumage.

Family V. IBIDIDÆ. IBISES.

[Case 35.] The Ibises are numerous represented, and all may be readily distinguished from their near allies the Spoonbills and from the Storks by the long, curved, "Curlew-like" bill, with the nasal groove extending nearly to the extremity. The White and Scarlet Ibises, belonging to the genus *Eudocimus* (667, 668), are striking American species, especially the latter. The Glossy Ibis (*Plegadis falcinellus*) (669) is of special interest, having visited Great Britain on many occasions; and other striking forms will be found in the Giant Ibis (*Thaumatibis*) (670) from Cochin China, the crested Madagascar genus (*Lophotibis*) (671), the African Hadadah Ibis (*Hagedashia*) (675), the Wattled Ibis (*Bostrychia*) (674), and the curious straw-necked Australian form (*Carphibis*) (677). The most interesting of all is, however, the Sacred Ibis (*Ibis aethiopica*) (678), which was regarded with great veneration by the ancient Egyptians, as is shown by the many mummies of these birds found in the temples.

Family VI. PLATALEIDÆ. SPOONBILLS.

[Case 36.] The Spoonbills, represented by three genera and several species, are at once distinguished from all the other long-legged Storks and Herons by their remarkably shaped flattened bill. One of the handsomest is the Roseate Spoonbill of America (*Ajaja*) (679), and another striking bird is the allied Australian form (*Platibis*) (680); but the most familiar is the common species (*Platalea leucorodia*) (682), which once bred

regularly in England, but is now only a straggler to our shores. Like its allies, it almost always breeds in colonies; the nest, a mass of twigs, flags, or sticks, is sometimes placed in reed-beds or on low bushes, but more usually in a tree. Four or five rough white eggs with red-brown spots are the full complement for a sitting.

Order XVI. ANSERIFORMES. DUCK-TRIBE.

Family ANATIDÆ. MERGANSERS, DUCKS, GEESE & SWANS.

The cosmopolitan family *Anatidæ*, which alone comprises this Order, includes the Mergansers, Ducks, Geese and Swans. They are all easily recognised by their external characters, such as the flattened or partially flattened bill, short legs and fully webbed toes, which distinguish them from the Screamers and Flamingoes. The majority of the species find their food under the water, which is drained away between the lamellæ with which the edges of the soft-skinned bill are provided, and which act like a sieve in retaining the substances or animalcules fit for food. In the Geese these lamellæ are harder and adapted for cutting grass, while in the Mergansers they are recurved to prevent the captured fish from escaping. [Cases 37-42 & Central Case.]

A curious feature about many of the Ducks, apparently peculiar to all those species in which the male is more brightly coloured than the female, is that after the young are hatched the male moults his bright plumage and assumes a dull-coloured dress similar to that of the female. This change is no doubt protective, for during the moult the male, having cast all his flight-feathers, is practically helpless. The "eclipse" plumage lasts for several weeks till the quills have been renewed, and is then replaced by new feathers of the normal bright livery.

On the lower shelves of this Case the visitor will find various species of "Saw-bills," as the genus *Merganser* and its allies are commonly called. The Red-breasted Merganser (*M. serrator*) (684), the Goosander (*M. castor*) (685), and the beautiful Smew (*Mergus albellus*) (686) are all three British species, the first two breeding in the north of Scotland. The Merganser is much the commonest and is particularly hated by fishermen on account of the enormous numbers of fish it catches, including small trout and salmon-fry. A remarkably handsome species is the North-American Hooded Merganser (*Lophodytes cucullatus*) (687), which has occasionally been obtained in Great Britain and Ireland during severe winter-weather. The Red-breasted Merganser hides its nest among thick heather or coarse grass, but the other species mentioned almost always select a hollow tree. [Case 37.]

The genus *Merganetta*, represented by the Chilian Merganser or

Torrent-Duck (*M. armata*) (688), frequents the high mountain torrents of the Andes, and forms a link between the true Mergansers and the stiff-tailed Diving-Ducks, but differs from the former in having no teeth on the edges of the mandibles and in having the bend of the wing armed with a strong spur. The New Zealand Soft-billed Duck (*Hymenolæmus malacorhynchus*) (689) is worthy of special notice on account of its remarkable bill with a dependent membrane, suited for the capture of insect larvæ on which it principally feeds.

[Case 37.] The Stiff-tailed Ducks, so-called from their rather long, narrow, rigid tail-feathers which are often carried erect when the bird is swimming, include several genera of which representatives will be found in the White-headed and Australian species of *Erismatura* (690, 691), the American Masked form (*Nomonyx*) (693), and the Musk-Duck (*Biziura lobata*) (692). The latter, whose name is derived from the strong musky odour of the sitting female, frequents the seas as well as the lakes of Australia and Tasmania. It is much the largest species of the group, and remarkable on account of the leathery chin-pouch found in both sexes. The appendage opens under the tongue and is largest in the male, giving the bird a very peculiar appearance. Like its allies it is an expert diver and can remain for a long time submerged. It seldom, if ever, flies in the daytime, but will do so at night. The nest is placed in a swamp or in a bank, and contains two or three olive-coloured eggs.

Of Sea-Ducks we may first mention the Eiders, which are all inhabitants of northern waters, and are represented by Steller's Eider (*Heniconetta stelleri*) (694) and the King- and Common Eiders (*Somateria spectabilis* (695) and *S. mollissima* (696)), all of which are included in the British List. Their nests supply the "Eider down" which forms an important article of export in countries such as Norway, where the common species is protected by law and consequently exceedingly numerous. It will be noted that the series exhibited shows the changes from summer- to winter-plumage in both the old and young drakes, the "eclipse" or intermediate autumn-plumage being specially interesting.

[Case 38.] The South-American Rosy-billed Duck (*Metopiana*) (697) is often kept on ornamental waters in this country. The Pochards (*Netta* and *Nyroca*) include the Red-crested (698) and Ferruginous (701) species, both of which occur in Great Britain as occasional stragglers, as well as the Common Pochard (699) and the Canvas-Back (700) from North America, famous for its excellent qualities as a bird for the table. The Tufted Duck (*Fuligula*) (703) breeds plentifully on the lochs and ponds of Great Britain and Ireland, and is easily recognised by the long drooping occipital crest developed in both sexes; the Scaup

(704), belonging to the same genus, has been proved to breed occasionally in the north of Scotland. The drakes of both the Golden-eye (706) and Buffel-headed (707) Ducks (*Clangula*) are very handsome black-and-white forms and these species are included in the list of British Birds, the former being a regular winter-visitor, but the latter only a rare North American straggler. Another common winter-visitor to our coasts, the Long-tailed Duck (*Harelda*) (708), is said to breed occasionally in the Shetlands, but the remarkably handsome Harlequin (709), which is placed next to it, is only an accidental straggler from the north.

The Scoters (*Oedemia*), of which three species are exhibited, are all [Case 38.] British Sea-ducks. The males are easily recognised by their black plumage, the common species (*O. nigra*) (710) being numerous on our coasts, especially in winter. Lastly we come to the large Steamer or Logger-head Duck (*Tachyeres*) (713), from the coasts of Chile and the Falkland Islands; only the young birds are able to fly, the adults losing the power of doing so.

Passing by the curiously marked Freckled Duck (*Stictonetta*) (715) [Case 39.] of South Australia at the foot of the Case, we come to the various species of Teal, a large group of smaller species referred to several genera. Among the most striking we may mention the very handsome Cinnamon-Teal (*Querquedula cyanoptera*) (717). The Garganey (*Q. circia*) (719), the Blue-winged (*Q. discors*) (718), and the American Teal (*Nettion carolinense*) (724) are all on the British List, but the last two only appear as accidental visitors. Closely resembling the last we have the Common Teal (*N. crecca*) (725), and may draw attention in passing to the drake exhibited in complete "eclipse-plumage" like that of the female. The most beautiful member of the genus is, however, undoubtedly the Baikal Teal (*N. formosum*) (728), and another very fine bird is the Falcated Teal (*Eunetta falcata*) (729) with its green occipital crest.

Of the genus *Anas* which follows several species will be found. [Case 39.] The Spotted-billed Duck (*A. pæcilorhyncha*) (732) is a familiar Indian species, and one of the most striking is the Crested Duck (*A. cristata*) (734) from South America. The Wild Duck or Mallard (*A. boscas*) (735) is shown in various stages of plumage, the drake of the middle pair being in "eclipse-plumage."

At the foot of this Case we find some Ducks with remarkably [Case 40.] formed bills specially adapted for retaining small shells, insects, and vegetable matter. The Shovelers (*Spatula*) (737 & 738) include four species, two of which are exhibited, and the so-called Pink-eyed Duck (*Malacorhynchus membranaceus*) (739), which has a patch of pink feathers behind the eye. The Common Shoveler (*S. clypeata*) (738)

breeds in many parts of Great Britain, and has greatly increased since the Act for the Preservation of Wild Fowls was passed in 1876.

A rare and all but extinct form is the Flightless Duck (*Nesonetta aucklandica*) (740), from the Auckland Islands, to the South of New Zealand.

The Pintail (*Dafila acuta*) (742) and the Gadwall (*Chaulelasmus streperus*) (743) both breed in Great Britain, but are very local; males of both these species in "eclipse-plumage" resembling that of the female are exhibited.

Next come the Wigeons (*Mareca*), of which the typical species (*M. penelope*) (745) is one of the commonest British Ducks, while the American Wigeon (*M. americana*) (746) occasionally visits our coasts as a straggler from North America.

[Case 40.] The Sheld-Ducks (*Tadorna* and *Casarca*) are represented by various handsome species, but none more strikingly so than the common species *T. cornuta* (750), which is an abundant resident on our coasts. The female scarcely differs from the male in plumage, the markings being only rather paler and less defined. This species has a curious habit of breeding in burrows, which it either excavates for itself or appropriates from other burrowing animals. The only other member of the genus is the remarkable looking Australian form (*T. radjah*) (751). Of the genus *Casarca* the most familiar is the Ruddy Sheld-Duck (*C. rutila*) (748), which occasionally visits our coasts in considerable numbers and is frequently kept on ornamental pieces of water. The inter-tropical genus *Dendrocynna* includes the Tree-Ducks, mostly birds of chestnut or brown plumage. They are remarkable for their long hind toe, and habitually perch on trees, placing their nest, which contains from six to twelve eggs, in a hollow tree, on a stump, or in long grass. The geographical distribution of some of the species of Tree-Duck is very remarkable, *D. viduata* (754) being found in S. America and the west Indies as well as Africa and Madagascar, while *D. fulva* (753) ranges from the United States and S. America across Africa and Madagascar to India and Burma. The last species in this Case is the Egyptian Goose (*Chenalopex aegyptiaca*) (755).

[Case 41.] Commencing at the foot of the next Case we come to the "Grey" Geese belonging to the genus *Anser*. Of these the Grey Lag (*A. ferus*) (760) is the only species that breeds in Great Britain, a few pairs remaining to nest in the north of Scotland and in the Hebrides. The Pink-footed (757), Bean (758), and White-fronted Geese (759) are all regular visitors to our coasts during the colder months, while the Lesser White-fronted (*Anser erythropus*) (759 a), and the Snow-Goose (*Chen hyperboreus*) (761), a North American species, sometimes occur in very severe weather. The Bernacle-Goose (*Branta leucopsis*) (763) is another

regular visitor, being more numerous along our western shores, and its handsome red-breasted ally (*B. ruficollis*) (765) very rarely wanders as far west as Great Britain. The commonest species that visits us is undoubtedly the Brent-Goose (*Branta bernicla*) (764), which is specially numerous along the east coast and may sometimes be seen in almost countless multitudes. The two forms of this bird are exhibited; the one having the underparts pale whitish-grey, while in the other they are dark grey or brown. Another familiar member of this genus is the large Canada Goose (*B. canadensis*) (762), which has for more than two centuries been domesticated in this country.

The Emperor-Goose (*Philacte*) (766) and the Sandwich Island Goose [Case 41.] (*Nesochen*) (767) are two somewhat remarkable forms, the latter being a very rare species which inhabits the craters and lava-flows on the hills of the Hawaiian Islands.

To rather a different group belong the South American Upland-Goose and its allies (*Chloëphaga*) (768-770), the Abyssinian Dwarf-Goose (*Cyanochen*) (771), and the Australian Maned Goose (*Chenionetta*) (772). The Upland Goose is a familiar bird to many, for being a large, handsome and hardy species, it is frequently kept on ornamental waters in this country.

The last section of the *Anatidæ* includes the Spur-winged Geese [Case 42.] (*Plectropterus*), represented by the N.E. African form *P. rüppelli* (773), characterised by its high frontal knob, and the Muscovy Duck (*Cairina moschata*) (774) of Tropical South America, with its bare red face and fleshy wattles, frequently kept in a domestic state both in this and other countries. Another remarkable form is the Indian and N. African Black-backed Goose (*Sarcidiornis melanonota*) (775), the bill of the male being ornamented with a fleshy comb which is about 2 inches high in the breeding-season. Both these and the Muscovy Ducks (774) nest in hollow trees.

The White-winged Wood-Duck (*Asacornis scutulata*) (776) and the Pink-headed Duck (*Rhodonessa caryophyllacea*) (777), the only members of their respective genera, are both peculiar to the Indo-Burmese countries. The colouring of the latter is specially remarkable, the delicate pink head and neck being quite unlike that of any other Duck. The Pigmy Geese or Cotton-Teal (*Nettopus*) (778-780) are all natives of the Old World, and several species representing these handsome little birds are exhibited. The lovely Summer-Duck (782) of N. America, and the still more splendid Mandarin-Duck (781) from N.E. Asia and Japan, constitute the genus *Æx*. With the full-plumaged male of the former will be found another example in complete "eclipse-plumage" like that of the female.

The Black-and-White Goose (*Anseranas semipalmatus*) (783) is the

representative of a distinct subfamily, with the toes only half-webbed and the hind toe very long and on a level with the other toes. Another striking semipalmate form, also the type of a different subfamily, is the Cape Barren Goose (*Cereopsis nova hollandiæ*) (784) from South-east Australia and Tasmania.

[Central Case.] In the large central Case in the middle of the Gallery will be found the Swans, which constitute the last subfamily, *Cygninæ*. Three species visit the British Islands, viz. the Mute or Polish Swan (*Cygnus olor*) (785), commonly seen on ornamental waters, the Whooper and Bewick's Swans (*C. musicus* (787) and *C. bewicki* (788)). Other forms exhibited are the North-American Trumpeter-Swan (*C. buccinator*) (786), the South-American Black-necked Swan (*C. melancoryphus*) (790), and, most graceful of all, the Australian Black Swan (*Chenopsis atrata*) (789), which may be seen with its cygnets in the middle of winter on the ornamental waters in the London Parks. Lastly the Coscoroba Swan (*Coscoroba candida*) (791), from the southern parts of South America, which forms a connecting link between the Swans and Geese.

Order XVII. PHÆNICOPTERIFORMES.

Family PHÆNICOPTERIDÆ. FLAMINGOES.

[Case 42 and Central Case.] The Flamingoes, with their enormously long neck and legs and curious decurved bill specially adapted for sifting their food, are so familiar that they require no description. They are found over the temperate and tropical regions of both the Old and New Worlds, the best known being the Common Flamingo (*Phœnicopterus roseus*) (792). This bird is a migrant to Southern Europe and a rare straggler to Britain during the summer. It usually frequents the brackish and salt-water marshes near the sea-coast, where it congregates in large colonies and builds mud-nests which rise like little islands some inches above the surface of the water [see group in Central Case]. It was long supposed that the birds incubated their single egg by standing astride their nests with their feet resting in the water, but it has now been ascertained that their legs are doubled up under them and their long necks gracefully curled away over their backs. As in the Ducks, the young are able to run as soon as they are hatched. Other forms shown are the Ruddy Flamingo (*P. ruber*) (793) from Tropical America, and the Small Flamingo (*Phœniconaias minor*) (794), which ranges from Africa to India.

Order XVIII. PALAMEDEIFORMES.

Family PALAMEDEIDÆ. SCREAMERS.

This Order includes only three species referable to two genera, which, though most nearly allied to the Ducks, differ from them in many important particulars. The bill is short and fowl-like with a decurved tip, without laminae or tooth-like processes on the sides, and the long toes are only partially united by rudimentary webs. The skeleton shows some very remarkable peculiarities, such as the absence of uncinatæ processes to the ribs. [Case 42.]

The three known species are all peculiar to South America, and are represented by the Derbian Screamer (*Chauna chavaria*) (795), a heavy looking bird with the wing strongly armed with a couple of powerful spurs. They frequent marshes and shallow water, wading and swimming, and in spite of their weight are birds of powerful flight, soaring in immense spiral circles till they are almost out of sight. Standing with head thrown back, both male and female utter a very loud cry, which may be heard at a distance of two miles.

Screamers are often kept by the natives in a state of domesticity, and prove efficient guardians of the poultry-yard against birds of prey and other enemies.

Order XIX. PELECANIFORMES. PELICANS AND ALLIES.

The members of this Order, often called *Steganopodes*, are characterised by having the hind toe united to the second toe by a web, so that all four toes are webbed. In this respect they differ from all other birds. They are sociable in their habits, and as a rule feed and nest in companies, their food consisting almost exclusively of fish. [Cases 43, 44.]

Family I. PHALACROCORACIDÆ. DARTERS AND CORMORANTS.

The four species of Darters or Snake-birds (*Plotus*) (797-799), two of which are exhibited on the lowest shelf of this Case, are fresh-water divers inhabiting the tropical and warmer temperate regions of the world. They are remarkable looking birds, with the bill long and pointed and the edges of the mandibles serrated to enable the bird to hold its slippery prey. As may be seen by examination of the skeleton (798), the articulation of the cervical vertebræ is very remarkable and the curious "kink" in the neck, so characteristic of these birds, is really a spring-like arrangement worked by powerful muscles. When the bird spears a fish the "spring" is released and the bill darts forward

with lightning speed and unerring aim, and the prey is transfixed in a moment. The bird then rises to the surface, and jerking the fish into the air dexterously catches and swallows it. The flight is laboured, but in the water they are perfectly at ease, swimming with only the head and neck exposed, or, if danger threatens, with only the beak above the surface. When diving in pursuit of fish, the wings are but little used, the feet acting as powerful paddles. The nest, which is made of sticks and lined with roots or moss, is placed in a tree or bush, generally in company with many others. The eggs are from two to five in number, chalky greenish-blue, and much like those of Cormorants but smaller.

- [Case 43.] About forty species of Cormorants (*Phalacrocorax*) (800-806) are known, distributed over almost the entire face of the globe. The bill is more raptorial than in the Darters and furnished with a hook at the end. Two species occur commonly on our coasts, the Common Cormorant (*P. carbo*) (800) and the Green Cormorant or Shag (*P. graculus*) (801). The ornamental white plumes on the head and neck of the former and the crest on the latter are only assumed during the breeding-season and are afterwards shed. Examples of both these species in adult and immature, brown or brown-and-white, plumage are exhibited. Almost all the species are black, or black and white, more or less glossed with purplish, blue, or green. A number of very handsome white-breasted species inhabit the colder parts of the Southern Hemisphere, ranging from South America to New Zealand. An example of these will be found in the White-bellied Cormorant (*P. albiventer*) (802); and two handsome little species from New Zealand and Australia, the Frilled and White-throated Cormorants (*P. melanoleucus* (805) and *P. brevirostris* (806)), are also exhibited.

Family II. SULIDÆ. GANNETS.

- [Case 43.] The Gannets or Boobies (*Sula*) (807-810) are a widely distributed group of oceanic birds represented by about a dozen species. They are easily recognised by their long, stout, tapering bill, sharply pointed at the tip and serrated on the cutting edges of the mandibles, their long pointed wings and wedge-shaped tail. All are birds of very powerful flight and capture the fish on which they prey by diving, the headlong plunge being made with great velocity from a considerable height. One of the most familiar is the Common Gannet or Solan Goose (*S. bassana*) (807), a well-known British species which nests at several stations, such as Lundy Island, Grassholm, the Bass Rock, Ailsa Craig, St. Kilda, the Little Skellig, &c. The nest, a mass of seaweed and grass, is placed on a ledge of rock or, in some cases, on a low tree, and

the eggs have a pale blue shell overlaid with a chalky white coating. The closely allied Australian species (*S. serrator*) (808), also exhibited, differs in having the two middle pairs of tail-feathers black. A more slender and widely distributed form is the Red-footed Gannet (*S. piscator*) (809); and a different type is shown in the Brown Gannet or Booby (*S. sula*) (810), which has an almost cosmopolitan distribution.

Family III. PELECANIDÆ. PELICANS.

Pelicans (*Pelecanus*) (811-815) are so extraordinary in their appearance that, when once seen, they can never be mistaken for any other bird. The great ungainly body, long flat bill hooked at the tip, enormous gular pouch, short legs, and waddling gait make up a truly remarkable whole. About nine species are known to inhabit the tropical and temperate parts of the world, frequenting not only tidal waters but lakes and swampy districts, where, being very gregarious in their habits, they often congregate in great numbers. [Case 44.]

In spite of their ungainly appearance they are perfectly at home both on the wing and in the water, and with head drawn back between the shoulders and legs extended beneath the tail, fly with great power. They frequently soar in a spiral to great altitudes, and with alternate flapping and sailing movements circle for hours:

The food, which consists almost exclusively of fish, is generally captured by diving, but not infrequently a number of birds combine together and forming single, double, or even triple lines across a sheet of water, drive the fish before them towards the shallows, where they are easily captured. The White Pelican (*P. onocrotalus*) (811) is the most familiar, and in former times was a native of Great Britain. The Dalmatian Pelican (*P. crispus*) (812) is the largest of all and has a curious crest of loose curled feathers, and the handsome Brown Pelican (*P. fuscus*) (815) is the smallest. The Australian form (*P. conspicillatus*) (813) has a bare space round the eye enclosed by a ring of feathers. [Case 44.]

The North-American White Pelican (*P. erythrorhynchus*) (814) is remarkable for the curious horny excrescence which is developed on the upper mandible during the breeding-season and afterwards shed. Two of these horny discs, the castings of previous years, are exhibited with the head of this species.

Family IV. FREGATIDÆ. FRIGATE-BIRDS.

This family is represented by two species only, which are exhibited in the Case. Both the Greater Frigate-Bird or Man-of-war Bird (*Fregata aquila*) (816) and the Lesser Frigate-Bird (*F. ariel*) (817) inhabit the [Case 44.]

intertropical oceans, and in outward appearance, as well as in habits, resemble some of the lower Birds of Prey, such as Kites. Their strongly hooked bill, large gular pouch, very short legs feathered to the toes which are only united by very small webs, immensely long wings, and deeply forked tail, are all striking characters. Their powers of flight are perhaps superior to those of any other bird, and they employ their great speed to overtake and rob the smaller sea-birds, harassing them till they drop or disgorge their prey, which is dexterously caught in mid-air and swallowed. They also kill and devour numbers of young birds, even those of their own species. The nest is made of sticks and placed in trees or bushes, sometimes on the bare rocks. The single egg is very similar in appearance to that laid by the Cormorant, and both sexes take part in the duties of incubation.

Family V. PHAËTHONTIDÆ. TROPIC-BIRDS.

- [Case 44.] Only six species of Tropic- or Boatswain-Bird (*Phaëthon*) (818-822) comprise this small family and, as their name implies, inhabit the inter-tropical oceans. They are easily distinguished from the other Pelican-like birds by their sharp-pointed bill serrated along the edges, and by the middle pair of tail-feathers being greatly elongate and attenuated. The legs are so very short that the gait on land is awkward and shuffling, and they can only rise with difficulty from the level ground. Tropic-Birds are often met with hundreds of miles from land, and their rapid flight is performed by quick pulsations of the wings. They will often follow vessels for hours, sometimes soaring high overhead in circles or settling on the rigging. No nest is made, and the single mottled purplish-brown egg is generally laid in a hole or crevice of the cliff, though sometimes a hollow tree is resorted to. Of the three species exhibited the most striking is perhaps the Red-tailed Tropic-Bird (*P. rubricauda*) (818) with its silver-white plumage and scarlet streamers, while the Fulvous Tropic-Bird (*P. fulvus*) (820) from the Indian Ocean is another remarkable form.

Order XX. CATHARTIFORMES.

Family CATHARTIDÆ. TURKEY-VULTURES.

- [Case 45.] These aberrant Birds of Prey are found only in America. In their habits they closely resemble the Vultures of the Old World, but they differ so much from the true Accipitrine Birds in their anatomy and osteology that they are now placed in a separate order. We may specially mention the peculiarity of the nostrils, which are pervious and not divided from one another by a bony septum or partition (p. 144, fig. 9).

Chief of the New World Vultures is the gigantic Condor of the Andes (*Sarcorhamphus gryphus*) (824), exhibited in one of the central Cases in the Bay. It is one of the largest living birds, the expanse of the wings in some examples attaining to nine feet or more, as may be seen by an inspection of the fine adult male mounted with its wings partially expanded. Other remarkable birds of this group (Case 45) are the Californian Vulture (*Pseudogryphus californianus*) (825), now only found in Southern and Lower California, but formerly extending much farther north to British Columbia; the King-Vulture (*Gypagus papa*) (826), with its brilliantly coloured bare face; and the Black Turkey-Vulture (*Catharistes urulu*) (827) and its allies, common in the towns and villages from the Southern United States southwards. These latter when not molested become remarkably tame and fearless, walking about the streets in search of carrion. [Table-case.]

Order XXI. SERPENTARIIFORMES.

Family SERPENTARIIDÆ. SECRETARY-BIRDS. (Plate XII. fig. 2.)

This remarkable group of the Birds of Prey includes only two African species belonging to the genus *Serpentarius*; *S. serpentarius* (828) being confined to the southern and eastern parts of that Continent, while *S. gambiensis* ranges from Senegambia to Southern Abyssinia. The name "Secretary" is derived from the tuft of long feathers hanging over the back of the head, which are supposed to resemble the quill-pens an ideal secretary would carry behind his ear. The legs are abnormally long, the toes partially webbed, and the middle pair of feathers of the wedge-shaped tail are greatly elongate. These birds live almost exclusively on Reptiles and, as they destroy large numbers of poisonous snakes, are strictly protected by law. The Secretary usually kills its prey by delivering rapid forward kicks with its powerful feet, beating to pulp rats and such-like; but if a venomous snake is attacked the body is carefully shielded with its outspread wings. It is said to kill reptiles occasionally by carrying them aloft and dropping them. The huge nest of sticks etc. is placed in a bush or tree, and the two or three eggs are white with rusty markings. [Case 45.]

Order XXII. ACCIPITRIFORMES.

VULTURES, HAWKS, AND OSPREYS.

This Order includes all the remaining Birds of Prey, characterised by their short, strong, sharp-edged beak, with the upper mandible curved downwards and terminating in a pointed hook, and by having all four [Cases 45-53.]

toes armed with strong curved claws. By means of these powerful weapons they are able to seize and kill their prey and to tear up the flesh. They are monogamous, and the female is generally larger than the male. The eggs are few in number, and the young when hatched are in a naked and helpless condition.

Three families are recognised, the first including the Vultures (*Vulturidæ*), the second the Eagles and Hawks (*Falconidæ*), and the third the Ospreys (*Pandionidæ*).

Family I. VULTURIDÆ. VULTURES.

[Cases 45, 46, and Table-case.] These Birds of Prey inhabit the tropical and subtropical portions of the Old World, where they represent the Turkey-Vultures (*Cathartidæ*) of America. As has already been mentioned above, they differ from the latter birds in many important particulars, but in their habits they are very similar. They feed chiefly on the carcasses of dead animals which their keen sight enables them to discover, and though many naturalists have maintained that it is chiefly by the sense of smell that they find their prey, there can be no doubt that this is a mistake, as has been proved by experiments. Their claws being short and rather blunt, Vultures rarely attack and kill living animals; they are cowardly sluggish birds, endowed with extraordinary powers of flight.

[Case 45.] The Cinereous or Black Vulture (*V. monachus*) (829), ranging from Southern Europe to China, is the only representative of the genus *Vultur*. It is rather solitary in its habits, breeding singly in trees and not in colonies like the Griffon-Vultures (*Gyps fulvus*) (830), all stages of which, from the nestling to the adult, will be found exhibited in the adjoining Central Case. This southern European species is one of the most familiar, and is specially numerous in Spain, where it breeds in caves in the perpendicular crags of the Sierras. Another representative of the genus is the Himalayan Griffon-Vulture (*G. himalayensis*) (831). A closely allied form, the White-headed Vulture (*Lophogyps occipitalis*) (832), will be found on the floor of the next Case, together with the Sociable or Eared Vulture (*Otogyys auricularis*) (833) and the Egyptian Vulture (*Neophron percnopterus*) (834), which has on more than one occasion wandered to Great Britain.

Family II. FALCONIDÆ. EAGLES AND HAWKS. (Plates XV., XVI., XXV.)

[Case 46.] Almost all the remaining Birds of Prey are included in this family, and are divided into six subfamilies, the Caracaras (*Polyborinæ*), the Long-legged Hawks (*Accipitrinæ*), the Buzzards (*Buteoninæ*), the Bearded Vultures (*Gypætinæ*), the Eagles (*Aquilinæ*), and the Falcons

(*Falconinæ*). The Carrion-Hawks or Caracaras are represented by the three American genera *Polyborus* (835 & 836), *Ibycter* (837 & 838), and *Milvago* (839), which differ from all the other subfamilies in having the inner as well as the outer toes united to the middle one by a web. The brightly coloured naked skin of the cheeks and throat gives them a very Vulturine appearance, and their food consists largely of carrion supplemented by birds, reptiles, and frogs, etc. They are more or less terrestrial in their habits, their long legs enabling them to walk and run with ease, and their partially webbed feet assist them in traversing marshy ground in search of their food. They are more or less gregarious, often hunting in families or small parties and roosting in companies.

The first of the Long-legged Hawks (*Accipitrinæ*) is the curious [Case 46.] Banded Gymnogene (*Polyboroides typicus*) (840), from tropical Africa, which feeds almost entirely on lizards and frogs. Next come the Harriers (*Circus*), of which a good many different species are known and easily recognised by their long slim form and the curious facial ruff, which gives them a superficial resemblance to the Owls. Three species, the Hen-Harrier (841), Montagu's Harrier (842), and the Marsh-Harrier or Moor-Buzzard (844), are found in Great Britain, but owing to their well-known partiality for eggs and young birds their numbers have been greatly diminished. All make their nest on the ground and lay white eggs. Other allied genera represented are the Harrier-Hawks (*Micrastur*) (846 & 847) from S. America, and the Black Goshawk (*Geranospizias niger*) (845).

The One-banded Buzzard (*Parabuteo*) (849) and the Chanting Gos- [Case 47.] hawk (*Melierax*) (850) require no special remark, but the latter is said to utter a mellow piping song. Of the true Goshawks (*Astur*), of which many species are known, attention may be drawn to the remarkable white Australian species (*A. novæ-hollandiæ*) (851), the Common Goshawk (*A. palumbarius*) (857), which still occasionally occurs in the British Islands and is greatly valued in Falconry for the pursuit of hares and rabbits, etc., and its North American representative (*A. atricapillus*) (853). A somewhat different Crested Goshawk will be found in *A. trivirgatus* (860). Closely allied to these, but distinguished by the longer, more slender legs and feet and the very long middle toe, the Sparrow-Hawks (*Accipiter*) are represented by the common species [Case 47.] (*A. nisus*) (866), a plentiful bird in the British Isles in spite of the numbers that are annually destroyed by gamekeepers and others. It is sometimes trained in this country to take Partridges, Quails, or Blackbirds, and in India and Japan is still prized by falconers. The smallest member of the genus is the Little Sparrow-Hawk (*A. minullus*) (865) from South Africa, and one of the largest is Cooper's (*A. cooperi*) (862) from temperate North America. After the rare Radiated

Goshawk (*Erythroriorchis radiatus*) (867), the Brown Buzzard (*Heterospizias meridionalis*) (868), and the Long-winged Buzzard (*Tachytriorchis albicaudatus*) (869), we come to the true Buzzards (*Buteo*), which somewhat resemble small Eagles in their flight and habits, preying on the smaller mammals such as rabbits, rats, and mice, as well as reptiles and insects. They do not capture their prey on the wing, and consequently seldom kill birds except young poultry. They must be regarded as useful birds to both farmer and agriculturist. A very handsome species is the Red-backed Buzzard (*B. erythronotus*) (870) from S. America. The Common Buzzard (*B. buteo*) (875) is still fairly numerous in various parts of Great Britain. As will be seen from the specimens exhibited on the lowest shelf of the Case, the plumage varies greatly, some old birds being almost uniform dark brown above and below. A large South American form will be found in the Giant Buzzard (*Geranoaëtus melanoleucus*) (876).

[Case 48.]

[Case 48.]

Next come the Buzzard-Hawks of America represented by several genera, *Buteola* (877), *Asturina* (878), and *Rupornis* (879), and the very handsome black-and-white species such as the White-spotted Buzzard (*Leucopternis melanops*) (881).

The Harpies include six very large powerful species placed in five genera, of which four are represented in the Case. The Crowned Harpy (*Harpyhaliaëtus coronatus*) (884), the Guiana Crested Harpy (*Morphnus guianensis*) (885), and the true Harpy (*Thrasaëtus harpyia*) (886) are all long-crested forms from South and Central America; and the latter, whose range extends into Mexico and Texas (where the species is locally known as the "Lobo volante" or "Winged Wolf"), is one of the most splendid as well as the most powerful of all the Birds of Prey. It feeds chiefly on mammals, including fawns, monkeys, foxes, and moderate sized pigs. An allied form, *Harpyopsis novæ-guineæ* (887), found in New Guinea, has the general appearance of a great Goshawk and is said to prey on Tree-Wallabies. The sixth species is the great Monkey-eating Eagle (*Pithecophaga jefferyi*) (887a) from the Philippine Islands.

[Case 48.]

The Bearded Vultures or Lämmergeiers (888) form the next sub-family *Gypaëtineæ*, which includes two very large species, one found from South Europe to the Himalaya and the other in Africa. They are much like Vultures in their habits but not such foul feeders. Like the Egyptian Vultures (*Neophron*) they are said to obtain the marrow from bones by carrying them up into the air and letting them fall from a great height, and land-tortoises are similarly treated. Hence the name "Bone-breaker" by which they are often known. Their flight is grand in the extreme, but the stories of their having carried off children are highly improbable, for in spite of their spread of wing they lack the strength of foot to do so.

The Eagles (*Aquilinæ*) are divided into two sections. The first, with [Case 49.] the legs feathered to the toes, includes some of the best known Birds of Prey such as the Golden Eagle (*Aquila chrysaëtus*) (890), ranging over Europe, N. Asia, and N. America, the Imperial Eagle (*A. heliaca*) (891), and its Spanish ally (*A. adalberti*) (893), the Spotted Eagle (*A. maculata*) (892), Verreaux's Eagle (*A. verreauxi*) (894), and the Great Wedge-tailed Eagle of Australia (*Uroaëtus audax*) (895), which forms a connecting link between the true Eagles and the Lämmergeiers. The Golden Eagle still breeds in some numbers in the highlands of Scotland and in Ireland, and the Spotted Eagle is an occasional straggler to our shores. The immature Golden Eagle has a large amount of white on the basal half of the tail-feathers, and is often mistaken for the young of the Sea-Eagle, a very different species [see Case 51].

Next in order come the Rough-legged Buzzards, or Buzzard-Eagles as [Case 50.] they have been called (*Archibuteo*), represented by *A. lagopus* (896), which ranges over Europe and Siberia to Alaska, and its N. American ally (*A. sancti-johannis*) (897), the former being a fairly common autumn-visitor to Great Britain. The Rufous-bellied Hawk-Eagle (*Lophotriorchis kieneri*) (898) is a remarkably handsome crested form from India and the Indo-Malayan countries, and it is interesting to note that another species of the genus is a native of North-western South America.

The Booted Eagle (*Eutolmaëtus pennatus*) (899) and Bonelli's Eagle (*E. fasciatus*) (900), both from Southern Europe and India, are well-known birds; and a very striking African ally, the Black-crested Eagle (*Lophoaëtus occipitalis*) (901), is also shown. The Bird-nesting Eagle (*Ictinaëtus malayensis*) (902), inhabiting the Indo-Malayan countries, spends most of its time on the wing hunting for nests and lives entirely on eggs and young birds. It not infrequently carries off nest and all in its talons, and examines the contents as it sails lazily away.

Other allies are the Hawk-Eagles (*Spizaëtus* and *Spiziastur*) (903– [Case 50.] 907), represented by four species, of which the finest is undoubtedly the magnificent Crowned species (*S. coronatus*) (904) from Tropical Africa. All the remainder of the *Aquilinæ* belong to the bare-legged section with the tarsus unfeathered. The African Buzzard-Eagle (*Asturinaula monogrammica*) (909) and the Laughing Hawk (*Herpetotheres cachinnans*) (908) are among the smaller members, the former, like the Chanting Goshawk already mentioned above, being remarkable among Birds of Prey for its mellow whistling.

At the foot of this Case will be found the Short-toed Eagle (*Circ- [Case 51.] aëtus gallicus*) (911) of Southern and Central Europe, etc., and several species of Serpent-Eagle (*Spilornis*), the crested form (*S. cheela*) (914) of India being a specially handsome bird. As their name implies, both these and the Short-toed Eagles feed principally on snakes and other

reptiles, while small mammals, birds, frogs, fish, crabs, and insects are also devoured. Another Oriental genus is represented by the Grey-faced Buzzard-Eagle (*Butastur indicus*) (916); and the Bateleur Eagle [Case 51.] (*Helotarsus ecaudatus*) (917), which is placed next it, is a peculiar short-tailed African form, and with its fiery-red face and feet is one of the handsomest Birds of Prey.

Next come the grand Sea-Eagles (*Haliaeetus*), which are fully represented by no fewer than five species. The White-tailed Sea-Eagle or Erne (*H. albicillus*) (918), which formerly bred round the coasts of the British Isles, is now probably only an autumn- and winter-visitor to our shores; the White-headed or Bald Sea-Eagle (*H. leucocephalus*) (919) is the North American representative form, and the handsomest of all is perhaps the Vociferous Sea-Eagle (*H. vocifer*) (920) from [Central Case.] Africa. Few kinds of fish, flesh, fowl, or carrion come amiss to these birds. In the large Central Case a very fine series of Steller's Sea-Eagle (*H. pelagicus*) (922) [Pl. XV.] is exhibited; the adult male, with the pure white shoulders and tail, is an unusually light-coloured specimen of its kind and no doubt a very old bird.

[Case 52.] In this Case are placed the Kites and Honey-Buzzards: commencing on the floor we find the handsome chestnut and white Brahminy Kites (*Haliastur*) (923, 924), the lovely Swallow-tailed Kite (*Elanoides furcatus*) (925) from America, and the Common and Black Kites (*Milvus milvus* and *M. korschun*) (926, 927). Though once a common bird in Great Britain, only a few pairs of the Common Kite or "Gled" have escaped destruction and nest in this country at the present time; the Black Kite has occurred twice as an accidental straggler to our shores.

[Case 52.] *Baza subcristata* (928) represents the rather large genus of Cuckoo-Falcons, extending from India through the Malay Peninsula to Australia, Madagascar, and Africa. They are all rare birds, and are remarkable in having two "teeth" in the upper mandible. Next to it will be seen Swainson's Kite (*Gampsonyx swainsoni*) (929), a beautifully marked diminutive form from Central and South America, the curious Hook-billed Kites (*Leptodon*) (930), their slender-billed ally (*Rostrhamus leucopygus*) (932), and the handsome Lead-coloured Falcon (*Ictinia plumbea*) (933), all from the same continent. After the Square-tailed species (*Lophoictinia isura*) (934) from Australia, we come to the Black-shouldered Kite (*Elanus*); a specimen of *E. caeruleus* (936) is said to have been obtained in Ireland in 1862, but the evidence appears to be insufficient. Lastly the curious South-American Double-toothed Falcon (*Harpagus bidentatus*) (937), which resembles the Cuckoo-Falcons (*Baza*) in having the upper mandible doubly notched, is worthy of special notice.

The Honey-Buzzard (*Pernis apivorus*) (938) is a regular summer-visitor to Great Britain, and a few pairs still breed where they are afforded protection. Andersson's Pern (*Machærhamphus anderssoni*) (939), an allied African form also shown, is a very rare bird with crepuscular habits and feeds, partly at least, on bats.

The Falcons [*Falconinæ*] are characterised by their short powerful bill, [Case 53.] which is provided with a tooth-like process on each side of the upper mandible. This sub-family includes the most typical raptorial birds, such as the Peregrine Falcon (*Falco peregrinus*) (951) [Pl. XVI.] and its allies, in which the compactly built body is formed so as to combine the maximum of strength with the greatest possible speed on the wing. At the foot of the Case are placed the Jer-Falcons (*Hierofalco*), which include some of the largest species, inhabiting the colder parts of the Northern Hemisphere. The most beautiful of these noble birds is undoubtedly the nearly white Greenland form (*H. candicans*) (942), which, like its allies the Iceland and Scandinavian Jer-Falcons (*H. islandus*) (944) [Pl. XXV.] and *H. gyrfalco* (945), occasionally visits Great Britain. Jer-Falcons were formerly held in high esteem by falconers for, though less bold than the Peregrine, their greater strength enables them to take quarry for which the Peregrine is no match. In the latter bird, various races of which are distributed over the Old and New Worlds, we have the most highly specialised Bird of Prey and the one most highly prized in Falconry at the present time. Besides the Common Peregrine a fine example of the Sháhin (*F. peregrinator*) (950), a darker-coloured Indian form, may be seen as well as the Lanner, Barbary, and Laggar Falcons (*F. feldeggii*, *F. barbarus*, and *F. jugger*) (947, 948, 949). Among the smaller Falcons will be found the Hobby (*F. subbuteo*) (952), and the Merlin (*F. æsalon*) (953), both well-known British species, and the Red-headed Merlin (*F. chiquera*) (954), a very handsome Indian species. [Case 53.]

The Black-legged Falconet (*Microhierax caerulescens*) (956) represents a group of diminutive Falcons inhabiting the Indo-Malayan region. In spite of their small size they are bold and dashing in their habits, and besides insects, capture birds as large as Quails. The allied genus *Poliohierax*, represented by Feilden's Falcon (957), is remarkable among birds of this group in having the sexes entirely different in plumage, the back of the female being dark chestnut. The Kestrels (*Cerchneis*), a somewhat numerous genus, are represented by the common species (*C. tinnunculus*) (958), plentiful in the British Isles and valuable to the farmer as a destroyer of mice, voles, and insects, and by the Lesser Kestrel (*C. naumanni*) (959), which appears on the British List as an occasional visitor from Southern Europe. In the Red-footed Falcon (*Erythropus vespertinus*) (962), as in the true Kestrels, the sexes differ

in plumage. Other forms represented are the Madagascar Kestrel (*Dissodectes zoniventris*) (961), the Australian Quail-Hawk (*Hieracidea berigora*) (963), and the Bush-Hawk (*Harpa australis*) (964).

Family III. PANDIONIDÆ. OSPREYS.

[Case 53.]

The last family includes the Ospreys and Fishing-Eagles, which occupy a somewhat intermediate position between the Hawks and Owls. They resemble the latter in possessing a reversible outer toe, which can be turned backwards or forwards at will, and the soles of the feet are provided with spicules to enable them to hold the fish on which they prey. The Osprey or Fish-Hawk (*Pandion haliaëtus*) (965) is a cosmopolitan species and, though now a very rare bird in Great Britain, bred till within a few years ago in one or two places in the North of Scotland. The other allied genus, *Polioaëtus*, includes three species of Fishing-Eagles inhabiting the Indo-Malayan region. The Grey-headed form (*P. ichthyaëtus*) (966) haunts rivers and its food consists almost entirely of fish.

Order XXIII. STRIGIFORMES. OWLS.

[Case 54.]

The Owls form a well-marked group of Birds of Prey and are mostly nocturnal in their habits. They are easily distinguished from all the Hawks, except the Harriers, by the facial disc surrounded by a ring of short crisp feathers and by the absence of the cere or naked wax-like skin at the base of the bill seen in almost all the true Accipitres. The large eyes are directed obliquely forwards and the upper eyelid shuts over the eye, and not the lower as in birds generally. The external opening of the ear is large and often extremely complicated in structure, while in some genera the right and left openings are asymmetrical. The outer and fourth toe is reversible at will, enabling the Owls to perch with either one or two toes behind. The eggs are oval in shape and white in colour, and vary in number from two to ten, the larger species as a rule laying fewer eggs than the smaller forms. The nesting-site is very varied; some breeding in holes in trees or in deserted birds' nests, while others prefer the ground, and *Speotyto*, the American Burrowing-Owl, uses the burrows of prairie-marmots and other small mammals. Many species are dimorphic, that is to say have two phases of coloration, a grey and a rufous. Two families are recognised, distinguished by various anatomical differences.

Family I. BUBONIDÆ. HORNED AND WOOD-OWLS.

The first group to be considered are the Fishing-Owls (*Ketupa*) [Case 54.] exhibited on the top shelf. Like the Ospreys, these birds have the soles of the feet covered with spicules, and their bare legs are also well-adapted for the capture of the fish which form their principal food. Four species are known and inhabit various parts of the Indo-Chinese and Malayan regions. Of the two exhibited, the Tawny Fishing-Owl (*K. flavipes*) (967) ranges from the Himalaya to China, while the Brown form (*K. ceylonensis*) (968), which, according to Mr. Hume, varies its diet with mammals, land-birds and crabs, occurs in the Indian Peninsula and Ceylon. Pel's Owl (*Scotopelia peli*) (969), an allied species from Tropical Africa, lacks the feathered tufts or horns, but is otherwise very similar.

The Eagle-Owls (*Buboninae*), of which examples are exhibited in a [Table-case.] separate Case in the centre of the Bay, include the largest of all the Owls. The Great Eagle-Owl (*Bubo ignavus*) (970), common on the Continent though rare in Great Britain, is partly diurnal in its habits and extremely destructive, its great strength enabling it to kill not only large game-birds, rabbits and hares, but even fawns. Its rare Siberian ally (*B. turcomanus*) (971) from Central and Southern Asia, and the handsome Spotted Eagle-Owl (*B. maculosus*) (972) from S. Africa, are also represented.

The Snowy Owl (*Nyctea*) (973), another very large species, inhabits [Case 54.] the Arctic regions of the Northern Hemisphere and is a not infrequent visitor to the British Islands. Its habits are diurnal, and it preys on hares and other smaller rodents, as well as birds and fish. The female is more profusely barred with black than the male, whose plumage is sometimes pure white.

The Hawk-Owls, represented by the North European species (*Surnia ulula*) (974) and the American subspecies (*S. caparoch*) (975), are also diurnal in their habits, both appearing on the British List as accidental stragglers to our shores.

The Scops- or Tufted-Owls (*Scops*) include a very large number of species and are found in nearly every part of the World. They are all birds of small size and of nocturnal habits. Several species are exhibited, including the common European form (*S. scops*) (976), which on many occasions has visited Great Britain, and the Screech Scops-Owl (*S. asio*) (977) of N. America, of which both the grey and rufous phases are exhibited.

Another genus, the Brown Hawk-Owls (*Ninox*), with numerous species, ranges from Asia through the Pacific islands to Australia. *N. scutulata* (981) is a common Indian form, while *N. strenua* (982) and *N. connivens*

[Case 54.] (983) are Australian, the former, as its name implies, being the giant of the group.

The Little Owl (*Athene noctua*) (984), which was probably originally imported from Holland, is now a common bird in some parts of the British Isles.

The allied genus of Pigmy Owlets (*Glaucidium*) contains numerous diminutive forms distributed over most regions of the Globe, and includes the smallest species of Owls, such as the Collared Pigmy Owllet (*G. brodiei*) (986) from the Himalaya, and the Common Pigmy Owllet (*G. passerinum*) (987) of Northern and Central Europe. Of special interest is the Burrowing Owl (*Speotyto cunicularia*) (989) of America, a small long-legged species, which lives in large communities in the burrows of the Prairie-marmot and other Mammals, and is mainly diurnal in habits.

The genus *Nyctala* is represented by both its members, Tengmalm's Owl (*N. tengmalmi*) (990), which inhabits the forests of Northern Europe, Siberia, and Arctic America and occasionally visits Great Britain, and the Saw-whet Owl (*N. acadica*) (991) from North America and Mexico.

Next come the Eared-Owls (*Asio*), including two well-known British species, the Long-eared Owl (*A. otus*) (993), and the Short-eared, Marsh- or Woodcock-Owl (*A. accipitrinus*) (994). The former almost always breeds in trees, using deserted nests of crows or squirrels, while the latter invariably makes a nest on the ground. During the vole plague on the Scottish Borders in 1890-92 enormous numbers of Short-eared Owls made their appearance in the infested districts and remained as long as food continued plentiful.

To the genus *Syrnium* belong the Tawny, Brown or Wood-Owl (*S. aluco*) (996) of Great Britain, and a number of other species such as the Mottled and Ural Wood-Owls, *S. ocellatum* (995) and *S. uralense* (998), from India and Northern Europe respectively. Of the Tawny Owl both the grey and rufous phases of plumage are represented. Closely allied to these is the Great Grey Owl (*Scotiaptex cinerea*) (999), the Arctic American representative of the Lapp Owl. The last member of this family is the Bay Owl (*Photodilus badius*) (1000), a peculiar form from the Indo-Malayan region, which occupies an intermediate position between the *Bubonidæ* and the *Strigidæ*.

Family II. STRIGIDÆ. BARN-OWLS.

[Case 54.] The Barn- or Screech-Owls (*Strix*) representing this family are nocturnal in their habits, and, as they feed almost exclusively on small rodents, are extremely useful birds and entitled to protection. They are

nearly world-wide in their distribution, but do not extend very far to the north. The most familiar form is the Common Barn-Owl (*S. flammea*) (1003), generally distributed throughout the British Islands and locally common in Europe and North Africa.

Order XXIV. PSITTACIFORMES. PARROT-TRIBE.

The Parrots include about 500 species, which are grouped into about 80 genera and 2 families. They possess certain characteristics which isolate them from the majority of birds, and have in consequence been placed in very varied positions in the numerous schemes which have been propounded for the classification of birds. On account of their superior intelligence some ornithologists have placed them at the head of the series, while others have associated them with the Picarian or climbing-birds on account of their zygodactyle foot with two toes directed forwards and two backwards. Their most natural position in a linear arrangement of birds appears to be after the Hawks and Owls and before the Picarian birds. Like the latter as well as many of the Owls, Parrots nest in holes and lay white eggs, while the cere or waxy skin covering the base of the bill is a characteristic feature shared with the Hawks. The form of the short, stout and strongly hooked bill, with the upper mandible moveable and articulated to the skull, is the most distinguishing character and one by which all Parrots may at once be recognised. The nestling, when first hatched, is completely naked but is subsequently covered with thick grey down. [Cases 55, 56.]

Family I. PSITTACIDÆ. TRUE PARROTS.

On the floor of this Case we find the Owl-Parrot or Kakapo (*Stringops habroptilus*) (1006) (the type of a distinct subfamily *Stringopinæ*), which, though possessing fully developed wings, is incapable of flight, and like many other New Zealand birds in a similar condition is rapidly disappearing. It derives its trivial name from the disc of feathers round the eye and from its nocturnal habits. During the day it hides in holes under roots of trees and rocks, but at sunset it emerges to feed on grass, seeds, berries and roots, etc., which form its principal food. It generally remains on the ground but occasionally climbs trees, when the wings are used to balance the body as the bird jumps from one bough to another. No nest is made, and the two or three large white eggs are deposited in a burrow under some root or rock. The Kakapo is said to be a very clever and intelligent bird and makes an affectionate and playful pet. [Case 55.]

In the next subfamily, *Psittacinæ*, which includes the bulk of the species, we commence with two ground-species resembling the remarkable

[Case 55.] Kakapo in general appearance, viz., the Ground-Parroquet (*Geopsittacus occidentalis*, (1007) and the Grass-Parroquet (*Pezoporus formosus*) (1008), both natives of Australia. Among the examples of the well-known Budgerigar (*Melopsittacus undulatus*) (1009), a remarkably handsome yellow variety will be seen; and, on the shelf above, the curious crested form known as the Horned Parroquet (*Nymphicus cornutus*) (1011), which inhabits the island of New Caledonia.

Among the many long-tailed Parroquets found in India, the Malay Archipelago, and Australia, and represented by such genera as *Cyanorhamphus*, *Neophema*, *Barnardius*, *Platycercus*, *Pyrrhulopsis*, *Aprosmictus*, *Polytelis*, and *Palæornis* (1012-1039), many beautiful forms will be found, including many well-known cage-birds such as the Rosella or Rose-Hill and Pennant's Parroquets (*Platycercus eximius* and *P. elegans*), (1024, 1025), the Red-shouldered Parroquet (*Ptilistes erythropterus*) (1020), the King-Parroquet (*Aprosmictus cyanopygius*) (1021), and the lovely little Turquoise Green Parroquet (*Neophema pulchella*) (1030); all from Australia. Of the well-known species of *Palæornis*, so often seen in captivity, several are exhibited; the Long-tailed Parroquet (*P. longicauda*) (1034) from Borneo, illustrating the nesting-habits of the group, will be seen on the floor of the Case; while the common Indian Rose-ringed species (*P. torquata*) (1033) and others are placed on the second shelf. Of the Australian genus *Polytelis* the Barraband's Parroquet (*P. barrabandi*) (1037) is remarkable for the great difference in plumage between the male and female, and Queen Alexandra's Parroquet (*P. alexandrae*) (1039) is equally noteworthy on account of its extreme rarity.

On the third shelf the small Love-Birds (*Loriculus*, *Agapornis*, and *Bolbopsittacus*) (1040-1046) are represented, and of the numerous species known many are favourite cage-birds.

On the top shelf the curious Racquet-tailed Parroquets (*Prioniturus*) (1047, 1048), from the Philippines and adjacent islands, and the Great-billed Parroquet (*Tanygnathus megalorhynchus*) (1049) from the same region will be found; also the Red-sided Eclectus (*Eclectus pectoralis*) (1050), the male of which is green and red, while the female is bright red and blue. Perhaps the best known member of this subfamily is the African Grey Parrot (*Psittacus erithacus*) (1052), a favourite cage-bird on account of the extraordinary facility with which it learns to talk

[Case 56.] and imitate sounds of all kinds.

On the floor of this Case we find the remarkable looking Pesquet's Parrot (*Dasyptilus pesqueti*) (1056) from New Guinea, and the well-known Amazon Parrots (*Uryzotis*) (1057-1080), of which several species are exhibited, and above these various allied South American genera such as the Conures (*Conurus*) (1069-1073) and the gaudy Macaws (*Ara*)

(1079-1081), which are placed at the top of the Case. The last genus of this subfamily includes the smallest of the group and is represented by the Pigmy Parrot (*Nasiterna pusio*) (1078), which with its congeners is confined to the Papuan subregion. On the top shelf are placed the Great Black Cockatoo (*Microglossus aterrimus*) (1089), the Ganga (*Callocephalum galeatum*) (1090), and the Yellow-and-Black Cockatoo (*Calyptorhynchus xanthonotus*) (1091).

The third subfamily *Cacatuinæ* includes the Cockatoos, most of which are well known in captivity. Commonest of all perhaps is the Cockateel (*Calopsittacus novæ hollandiæ*) (1082); and of the various species of Cockatoo (*Cacatua* and *Licmetis*), ranging from the Philippines to Australia, the handsomest is undoubtedly Leadbeater's Cockatoo (*C. leadbeateri*) (1087), while the most curious is the bare-eyed form known as the Slender-billed Cockatoo (*L. nasica*) (1088).

Family II. LORIIDÆ. LORIES OR BRUSH-TONGUED PARROTS.

(Plate XVII. fig. 1.)

The Brush-tongued Parrots may be divided into three subfamilies, the [Case 56.] *Loriinæ* or Lories, the *Cyclopsittacinæ* or Lorilets, and the *Nestorinæ* or Kaka Parrots.

To the first belong the genera *Chalcopsittacus*, *Eos*, *Lorius*, *Vini*, *Coriphilus*, *Trichoglossus*, etc. (1092-1106), all of which are represented and include some of the most lovely species of the group, many being familiar cage-birds.

The Lorilets include a number of small forms ranging from New Guinea to Australia and will be found duly represented by an example of the Mysol species (*Cyclopsittacus diophthalmus*) (1107).

The third subfamily is represented by the Kaka Parrot (*Nestor meridionalis*) (1108) [Pl. XVII. fig. 1], a native of New Zealand. Special interest attaches to this group on account of the carnivorous habits of the closely allied species known as the Kea (*N. notabilis*), which of recent years has developed an extraordinary liking for flesh. At first these birds contented themselves with devouring sheep's heads and other offal thrown out from the slaughter sheds, but as the taste for meat increased and became universal, they took to attacking living sheep, tearing open their backs to devour the kidney fat, and inflicting injuries that generally proved fatal. So destructive, indeed, have they become on some of the sheep-runs, that a price is paid by the Government of New Zealand for their destruction and their final extermination is probably only a matter of time.

Order XXV. CORACIIFORMES. PICARIAN BIRDS.

[Cases
57-63.]

This Order contains a number of families including the Oil-birds, Frog-mouths, Kingfishers, Rollers, Bee-eaters, Motmots, Todies, Hoopoes, Hornbills, Nightjars, Swifts, Humming-birds, and Colies. They differ greatly from one another in outward form, structure, and habits, possessing hardly a single feature in common by which they can be distinguished from other allied orders.

Family I. STEATORNITHIDÆ. OIL-BIRDS.

[Case 57.]

The Oil-bird or Guacharo (*Steatornis caripensis*) (1110), the sole representative of this family, inhabits the caves in the northern and north-western portions of South America, and is also found in the island of Trinidad. Both in its general outward appearance and in its crepuscular habits the bird bears a strong resemblance to the Nightjars, with which it has generally been associated and to which it is evidently closely allied. It differs, however, from these birds in its strongly-hooked and deeply-notched bill, feeds mainly if not exclusively on fruits, and lays from two to four pure white eggs. The large cheese-shaped nest, made of clay-like material and exhibited in the Case, is placed on ledges or holes in caverns. When about a fortnight old, the young become extremely fat and as it were enveloped in a thick layer of yellow grease. They are then destroyed in large numbers by the natives, who melt down the fat into a colourless oil known as guacharo-butter, which is used for purposes of illumination and for cooking.

Family II. PODARGIDÆ. FROG-MOUTHS.

[Case 57.]

The Owl-like birds comprising this family are only met with in the Indian and Australian regions, and are closely related to the Nightjars, but differ entirely in their mode of nesting and, like the Oil-bird, the majority lay white eggs. Three genera are recognised, *Podargus* and *Egotheles* being confined to New Guinea and Australia, while *Batrachostomus* is found in the Indo-Malayan countries and islands.

The Common Australian Frog-mouth (*P. strigoides*) (1111) makes a slightly constructed flat nest of sticks placed in the fork of a horizontal branch, and lays two white eggs, which are incubated by both parents. During the day these birds sleep in an *upright* position on the dead branch of a tree, the colour of their plumage harmonising so closely with their surroundings that they are almost invisible. Their prey appears to consist chiefly of insects such as mantis and locusts, captured on the tree-stems in a state of repose. The Eared Frog-mouth

(*B. auritus*) (1113) represents a group of smaller but closely-allied birds with very handsomely coloured plumage; the most diminutive members of the family are the Owlet-Nightjars such as *Æ. novæ-hollandiæ* (1114), which live in holes in trees during the day and capture their prey on the wing like the true Nightjars, though their flight is said to be less tortuous.

Family III. ALCEDINIDÆ. KINGFISHERS. (Plate XVIII.)

This large family, comprising about 160 species, is universally but [Case 55.] very unequally distributed over the globe. The majority come from the Malay Archipelago, from Celebes to New Guinea, and from this centre they radiate in every direction. In all, the eggs are round, white and glossy, and deposited in a hole in a tree or bank. The species are divided into two subfamilies, the Water-Kingfishers, *Alcedininae*, and the Wood-Kingfishers, *Daceloninae*. The former, characterised by their long, slender, compressed bill with a distinct keel or ridge along the upper mandible, are mainly fish-eating species; while the latter, with a stouter, wider bill, prey on insects, crustacea, reptiles, and occasionally on birds and small mammals.

To the subfamily *Alcedininae* belong the Stork-billed Kingfishers, such as the Burmese species (*Pelargopsis burmanica*) (1115), which occasionally varies its fish diet with small reptiles and young birds, and the members of the genus *Ceryle*, distributed over the Old and New Worlds, and remarkable among birds of this group on account of the difference in the markings of the sexes. One of the largest is the Ringed Kingfisher (*C. torquata*) (1116), belonging to the grey-backed section of the genus, while the green-backed South American species are represented by *C. superciliosa* (1118), one of the smallest of all the Kingfishers. The best known member of this section is the Common Kingfisher (*Alcedo ispida*) (1120) [Pl. XVIII.], the brightest of our indigenous birds and a familiar ornament of our rivers and lakes. Other smaller allied forms are the Malachite-crested Kingfisher (*Corythornis cristata*) (1121), and the Little Blue Kingfisher (*Alcyone pusilla*) (1123), which has only three toes.

The first of the *Daceloninae* to be mentioned are the diminutive members of the genus *Ceyx* (1124), which, like *Alcyone*, have only three toes, but frequent forests rather than streams; the equally small and beautiful forms of *Ispidina* (1125, 1126) found in Africa; the curious Saw-billed species (*Syma flavirostris*) (1127) from Australia; and the Black-cheeked *Carcineutes melanops* (1128). The large genus *Halcyon*, containing more than fifty species, is represented by a number of very beautiful forms, of which we may specially mention the

Sumatran and Lindsay's Kingfishers (*H. concretus* and *H. lindsayi*) (1136, 1137), and the strikingly handsome white-and-green species (*H. saurophagus*) (1139). Other notable forms are the Hooded and Blue-and-White Kingfishers (*Monachalcyon monachus* and *M. fulgidus*) (1139 a, 1140), the Sanghir Kingfisher (*Cittura sanghirensis*) (1141), the Huahine Kingfisher (*Todirhamphus tutus*) (1142), and the graceful Racquet-tailed species (*Tanysepta*) (1143-1145), ranging from the Moluccas and the Papuan Islands to N.E. Australia. On the ground floor will be found the extraordinary Shoe-billed Kingfisher (*Clytoceyx rex*) (1146) from New Guinea, in which the sexes are somewhat differently coloured; the Hook-billed *Melidora macrorhina* (1147), and the "Laughing Jackasses" of Australia (*Dacelo*) (1148-1150). These latter derive their trivial name from their extraordinary laughing note, familiar to many who visit our Zoological Gardens, and, unlike most of the Kingfishers, they thrive well in captivity.

Family IV. LEPTOSOMATIDÆ. KIROMBOS OF MADAGASCAR ROLLERS.

[Case 58.] The Kirombo or Vorondreo (*Leptosoma discolor*) (1151) inhabits the islands of Madagascar, Mayotte, and Anjouan, while a somewhat smaller form occurs in Great Comoro Island. These are the only representatives of this rather remarkable family, characterised by having the base of the bill hidden by recurved plumes, the nostrils linear and placed far forward in the middle of the upper mandible, and the fourth toe partly reversible. As will be seen in the Case, the male and female are quite different in plumage. Like the true Rollers, these birds have a habit of playing in the air, ascending to a great height, and then rapidly descending in a curve with nearly closed wings; they also nest in holes and lay white eggs.

Family V. CORACIIDÆ. ROLLERS.

[Case 58.] These brilliantly coloured birds, distributed over the greater part of the Old World, may be divided into two subfamilies. The first, *Brachypteraciinæ*, includes some curious ground forms peculiar to Madagascar, and represented by *Atelornis pittoïdes* (1152), *Uratelornis chimera* (1153), and *Geobiastes squamigera* (1154). They are forest-dwelling species, and almost entirely terrestrial and crepuscular in their habits, seeking their insect-food on the ground at dusk.

To the second subfamily, *Coraciinæ*, belong the true Rollers, of which the common species (*Coracias garrulus*) (1155) is a well-known European bird, which occasionally visits Great Britain during the spring and autumn migrations. Another very handsome example, from Southern Abyssinia and Somali-land, is Lort Phillips' Roller

(*C. lorti*) (1156), mounted flying to display its brilliant colouring. The Broad-billed Rollers (*Eurystomus*) (1160, 1161) represent the second, less brightly coloured, genus. All are active, noisy birds and their trivial name is derived from their peculiar habit (specially noticeable during the breeding-season) of rolling or turning somersaults in the course of their flight. The glossy white eggs are usually deposited in holes in trees or banks, in a very slight nest.

Family VI. MEROPIDÆ. BEE-EATERS.

These extremely brilliant and graceful birds inhabit the temperate [Case 58.] and tropical portions of the Old World, being most numerous in the Ethiopian region. As their name implies, their food consists of bees, wasps, and similar insects, which are captured on the wing. In districts where Bee-culture flourishes they are most injurious and are destroyed in large numbers. Like the Sand-Martins, the majority at least of the Bee-eaters breed in colonies in sandy river-beds, excavating tunnels from three to ten feet in length which terminate in a breeding-chamber, where from four to six glossy white eggs are deposited.

To the genus *Merops*, which has the central tail-feathers elongated, belong a number of species, the Common Bee-eater (*M. apiaster*) (1166) being the most familiar. This bird is well known in Europe as a summer-visitor, and is occasionally met with as a straggler in Great Britain. Another striking member is the Nubian Bee-eater (*M. nubicus*) (1163), remarkable for its brilliant crimson plumage. Of the numerous other forms exhibited we may draw special attention to the larger and brilliantly-coloured species of *Nyctiornis* (1173, 1174) found in the Indo-Malayan countries, and reported to nest in holes in trees.

Family VII. MOMOTIDÆ. MOTMOTS.

The Motmots are restricted to the New World, and range from [Case 58.] Mexico through Central and South America. Like their allies, the Todies, they have the edges of the bill serrated, and are generally to be distinguished by the long graduated tail, the median and longest pair of feathers being frequently racquet-shaped. From observations made from living specimens of Motmots in the Zoological Gardens, it seems fairly certain that the shape of the middle tail-feathers is artificially produced by the birds themselves biting off the vanes from the shafts. They frequent the dense forests, and, like Flycatchers, dart out after passing insects, which are caught in the air, though they also feed on small reptiles and fruits. They nest in holes in trees or banks, and lay creamy-white eggs. The birds shown include examples of three

of the seven genera recognised; *Momotus* (1176) and *Prionirhynchus* (1177) having racquet-shaped middle tail-feathers, while in *Baryphthengus* (1178) these feathers are normal.

Family VIII. TODIDÆ. TODIES.

[Case 58.] This family includes four diminutive West Indian species of the genus *Todus* (1179–1180), closely allied in structure to the Motmots, but differing from them externally, and resembling the Flycatchers in general appearance and habits. Like their allies, they nest in holes in banks and lay glossy white eggs.

Family IX. UPUPIDÆ. HOOPES.

[Case 58.] The birds comprising this family are distributed over Europe, Asia and Africa, and are divided into two subfamilies—the true Hoopes (*Upupinæ*), and the Wood-Hoopes (*Irrisorinæ*). To the former belong rufous-coloured species with large crests, such as the Common Hoopoe (*Upupa epops*) (1181), which is a regular visitor to Britain, and is occasionally known to breed in the south of England. It is widely distributed over temperate Europe and Asia, migrating southwards in winter to India, Arabia, and North Africa. These birds walk well, and pass much of their time on the ground hunting for insects and worms, the long bill being used to probe the soil; they also capture flies on the wing, and may frequently be seen climbing rocks or branches of trees in search of food. The nest is placed in a hole in some tree, wall, or rock, and being composed of slight materials cemented together with ordure, has a very offensive smell. The eggs are from four to seven in number and of a pale greenish-blue colour; the young resemble their parents in plumage, even the crest being well developed at an early stage. The trivial name is derived from the cry, which resembles the syllable “hoop” uttered two or three times in succession.

The Wood-Hoopes, represented by the genera *Irrisor* and *Rhinopomastus*, are peculiar to Africa, and all are long-tailed, dark-coloured birds with more or less metallic green, blue, or purple plumage. Their habits and mode of life are very similar to those of the Hoopes. One of the most remarkable in colour is Jackson's Wood-Hoopoe (*Irrisor jacksoni*) (1184), which has the head and throat nearly white; the species of *Rhinopomastus* (1185, 1186) are also noteworthy on account of their long and extremely curved bill, which is specially adapted for probing the crannies of trees in search of insects.

Family X. BUCEROTIDÆ. HORNBILLS. (Plate XIX.)

These remarkable looking birds, ranging from Africa and the Indo-Malayan regions to the Solomon Islands, derive their name from their immensely developed bill, surmounted in most of the genera by a variously-shaped casque, which is often of large dimensions and gives them a singularly top-heavy appearance. In spite of their size, the bill and casque are not nearly so weighty as one would suppose, being merely a horny shell supported internally by a cellular bony tissue of extreme delicacy. This structure may be seen in the sections of heads exhibited in the Case, that of *Dichoceros bicornis* (1190) [Pl. XIX. figs. *c* & *d*] illustrating the normal type; while *Bucorax abyssinicus* (1188) and *Rhinoplax vigil* (1212) are peculiar, the former in having the casque open anteriorly, the latter in having the anterior wall solid and the posterior part nearly filled up with parallel bony columns. The bones of the skeleton are also unusually pneumatic. The edges of the mandibles are generally roughly serrated, and the eyelid is furnished with strong lashes. The feet have broad soles, the second, third, and fourth toes being partially united. Though often prolonged for considerable distances, the flight is heavy, slow, and extremely noisy, the sound, which has been likened to the rushing of an express train, being probably caused by the air passing between the open bases of the quills at each beat of the wings. [Cases 59, 60.]

The nesting-habits of these birds are peculiar, and of extreme interest. After the eggs have been laid in the hollow of a tree, the female commences to incubate, and the male (sometimes assisted by his mate) closes up the entrance to the nest with a very hard clay-like substance, leaving only a small slit through which the female can protrude her bill and receive the fruits he brings her. If the male is killed, other males are said to take his place and provide the female with food. The object in closing in the female is no doubt to protect her from the attacks of monkeys and other enemies.

The female is said to remain imprisoned until the young are fully fledged, and in some species at least the wings and tail are shed and renewed during this period, the moulting of these feathers being no doubt a welcome relief to the bird in its cramped and stuffy cell. The adjacent table-case, containing the nesting-site of one of the smaller African Hornbills (*Lophoceros melanoleucus*) (1204) illustrates all these interesting facts.

The numerous species are divided into two subfamilies, *Bucoracinae* and *Bucerotinae*; the former including only two very large African species of Ground-Hornbills characterised by their long legs, which are well-adapted for walking. The Abyssinian Ground-Hornbill (*Bucorax*

abyssinicus) (1188) is almost omnivorous, devouring small mammals, reptiles, and all kinds of insects, and sometimes uniting with its fellows to attack and kill large snakes, against which they advance in company.

The *Bucerotinae* including all the remaining species, about sixty in number, are characterised by their comparatively short legs suited to their arboreal habits. They frequent dense forest and tall jungle, but at times descend to the ground to bathe, and dig up the loose soil with their bills. The food consists chiefly of fruit and berries; but small mammals, reptiles, and even fish are sometimes eaten.

The different genera are chiefly characterised by the shape of the casque, which varies greatly in form, and in some cases is very slightly developed.

The species, as may be seen by the examples shown in the Case, differ immensely in size, the Rhinoceros-Hornbill (*Buceros rhinoceros*) (1189) and Homrai (*Dichoceros bicornis*) (1190) [Pl. XIX. figs. *c* & *d*] being very large birds, while Cassin's Pigmy Hornbill (*L. camurus*) (1194) is comparatively small. Some species, such as the Rufous-necked Hornbill (*Aceros nepalensis*) (1199) [Figs. *a* & *b*] and the West African Hornbill (*Ceratogymna atrata*) (1203), have the plumage of the sexes entirely different in colour, and these, as well as many other forms, are provided with large crests. One of the most noteworthy is the Helmet-Hornbill (*Rhinoplax vigil*) (1212), from the Malay countries, with its solid-fronted casque (already alluded to) and its unusually long middle tail-feathers. The ivory-like part of the casque is much used by Eastern artists for carving and making brooches.

Family XI. CAPRIMULGIDÆ. NIGHTJARS. (Plate XVII. fig. 2.)

[Case 61.] The Nightjars, or "Goatsuckers" as they are often called, include a large number of species with soft Owl-like plumage ranging over the greater part of the world, but apparently absent from the Eastern Pacific Islands. They are mostly nocturnal in their habits, feeding on insects which are captured on the wing, but some species, such as the American *Chordiles* (1223-4), hawk in the full glare of the sun. The cry is generally harsh, and often loud and distinct, as in the North-American "Whip-poor-Will" (*Caprimulgus vociferus*) (1219). The two beautifully marbled oval eggs are usually laid on the bare ground without any nest; and the young, though helpless when first hatched, are covered with down. The species of *Phalaenoptilus* are an exception to the rule, and lay white eggs like their close allies the Oil-Birds and Frog-mouths.

Two subfamilies are recognised, viz., the *Caprimulginae*, characterised by having the claw of the middle toe pectinate or furnished with a kind of comb, and the *Nyctibiinae*, in which the claw of the middle toe is

normal. To the former group belong our Common Nightjar (*Caprimulgus europæus*) (1216), a summer-visitor to Britain, and a bird regarded with superstition by all European nations on account of its supposed habit of milking goats, though its food consists exclusively of moths, beetles, and such like. The peculiar "churring" sound uttered by the male on summer evenings is familiar to most residents in the country. Two other members of this genus, the Red-necked Nightjar (*C. ruficollis*) (1217) and the Egyptian Nightjar (*C. ægyptius*) (1218), have occurred as accidental stragglers to our shores.

Among the more remarkable forms we may call special attention to the African species *Macrodipteryx macrodipterus* (1221) and *Cosmetornis vexillarius* (1215) [Pl. XVII. fig. 2], which carry ornamental wing-plumes. In the former the ninth primary quill is enormously lengthened and ends in a "racquet," and in the latter it is even more extended, forming a sort of train when the bird is flying. In *Scotornis climacurus* (1232) from North Africa, and in the South American species of *Hydropsalis* (1231) and *Macropsalis* (1214) some of the tail-feathers are greatly lengthened. *Nyctidromus* (1228) is remarkable for the length of its legs, and is more terrestrial in its habits than the other species, being able to walk well. The Indo-Malayan species of *Lyncornis* (1229, 1230) have the feathers on the sides of the head elongate, forming ear-tufts.

The second subfamily includes certain Tropical American Nightjars belonging to the genus *Nyctibius*, and represented by *N. æthereus* (1233). These birds appear to breed in hollows of branches or stumps of trees, and not on the ground, as is shown by the nesting-site of *N. jamaicensis* (1234) exhibited on the floor of the Case.

Family XII. CYPSELIDÆ. SWIFTS. (Plate XX.)

The Swifts owe their trivial name to their extraordinary rapid flight, [Case 61.] which is practically unlimited in duration, and in some of the species, notably the spine-tailed forms of the genus *Chaturia*, is unsurpassed in speed by any other bird. Though resembling the Swallows in their outward appearance and habit of hawking insects on the wing, they differ widely from these birds in important points of structure. They are found all over the globe except in the extreme northern and southern regions. Three subfamilies are recognised—the *Cypselinæ* or true Swifts, the *Chaturinæ* or Spine-tailed Swifts, and the *Macropteryginæ* or Crested Swifts. In the first of these groups *all four toes are directed forwards*, but in the last two the hind toe is said to be occasionally versatile. Their toes, though well adapted for clinging, are so small that walking is difficult, and these birds experience great

[Case 61.] difficulty in rising from the ground. The nesting-habits vary greatly in the different genera: the species of *Cypselus* (1235-1237) (of which our Common Swift is typical) conceal their nests in holes and under eaves; *Panyptila* (1239) constructs an enormous pendent tube of interwoven seeds suspended from an overhanging rock by the saliva of the bird; *Collocalia* (1244-1247) [Pl. XX.] builds in caves, the well-known edible nests being composed of dried secretions of the salivary glands; and *Macropteryx* (1243) makes a small exposed nest on a branch or stump. The eggs, varying in number from one to five, are invariably pure white and devoid of gloss; the young are hatched naked.

To the first subfamily belongs our Common Swift (*Cypselus apus*) (1235), which, like most of its allies, is migratory, arriving in Europe early in May and departing to its winter quarters in Africa early in autumn. The Alpine Swift (*C. melba*) (1236), an occasional visitor to Britain, is a well-known summer-visitor to all the high mountains of Central and Southern Europe, breeding in the high crags and towers. The group of old and young birds exhibited in the case were taken from the old tower of the cathedral at Berne, formerly a well-known breeding-place, but now replaced by a new spire. The American genera *Panyptila* (1238) and *Aëronautes* (1249) have the toes feathered; the extraordinary nest built by the former has already been referred to. The Palm-Swifts (*Tachornis*), with the toes naked and arranged in pairs, attach their tiny nests, made of cotton-down and feathers, to the leaves of palms or to the grass roofs of native huts. A nest of *T. phænicobia* (1248) is shown in the Case. The *Chaeturinæ* include the Spine-tailed Swifts (*Chaetura*), with the shafts of the tail-feathers produced into a point or spine. Of these, *C. caudacuta* (1241), which nests in Siberia and migrates to Australia, is specially interesting, having occurred in Britain on more than one occasion.

The American genus *Cypseloides* (1240) calls for no special remark; but the species of *Collocalia* (1244-1247), ranging from the Indo-Malayan countries to Australia, are interesting on account of their nests, which furnish the birds'-nest soup so much esteemed by the Chinese. As may be seen by the various specimens exhibited in the Case, the nests vary greatly in texture; the best, termed "white" or "first quality," are entirely glutinous and highly prized, while the "brown nests," largely mixed with foreign substances, are considered hardly worth collecting. These birds breed in dark caves in huge colonies, sticking their nests close together on the rocky walls, or even joining them in masses.

The last subfamily includes only the handsome Crested Swifts (*Macropteryx*) (1243), ranging from India to Papuasias. Their peculiar nesting-habits have been briefly referred to above. The nest is a half-

saucer made of bark and feathers gummed by saliva to a branch, and is so small that the sitting bird entirely conceals it. Only one egg is laid.

Family XIII. TROCHILIDÆ. HUMMING-BIRDS.

The Humming-birds or Hummers, so called from the sound often produced by their vibrating wings, are exclusively a New World group, and must not be confounded with the Passerine group of Sunbirds (*Nectariniidæ*), which inhabit the Indian and African regions, and somewhat resemble them in outward appearance and habits. About five hundred species are known; and of these the majority inhabit Central and South America, but some are found in the southern United States, and *Selasphorus rufus* (1318) migrates northwards in summer to Canada and even Alaska. *Eustephanus galeritus* (1273 a) frequents Tierra del Fuego even in snowy weather; while *Oreotrochilus chimborazo* (1304) and *O. pichincha* (1303) are natives of the Andes of Ecuador, close to perpetual snow, at a height of 16,000 feet. All are very small birds, the largest being the Giant Humming-bird (*Patagona gigas*) (1308), about $9\frac{1}{2}$ inches long, while the smallest forms, such as *Mellisuga minima* (1326) and *Chetocercus bombus* (1326 a), are little larger than a bumble-bee and only measure $2\frac{1}{2}$ inches in length. [Case 62.]

The tongue of these birds is very peculiar, being slender, very long, and extensile. When drawn within the bill, the two branches of the hyoid bone which support its base curve upwards around the back of the skull, and then forward over the top of the head, as in the Woodpeckers (see preparation in Case). This arrangement allows the tongue to be suddenly protruded to a considerable distance and as quickly withdrawn. Unlike that of the Woodpeckers, the tongue is hollow and divided at the free end into two slender branches, each of which bears a thin membranous fringe on its outer margin.

The plumage is usually of a brilliant metallic nature, produced by the prismatic surfaces of the feathers, and in many forms crests, ear-tufts, neck-frills, and other ornamental plumes add to the gorgeous effect.

The wing-muscles are greatly developed, and enable the birds to sustain their untiring flight, which is more like that of a hawk-moth than a bird. The little creatures hover in front of a flower, suspended as it were in the air, their wings vibrating so rapidly that they merely appear like a grey film; an instant they remain poised, and then, with a flash of metallic colour, vanish with incredible speed.

The length and shape of the bill varies greatly in the different genera; some have the edges of the mandible strongly serrated towards the tip, while in others this serration is faint or absent. In the absence of

[Case 62.] more definite characters the absence or presence of the serration has been used in grouping the numerous genera, but the classification of the Humming-birds is extremely difficult, many of the genera being hard to define and grading imperceptibly into one another.

The first flight-feather is at times attenuated, as in the genera *Atthis* (1327), *Aglæactis* (1310), and others, or the shafts of the quills may be broad and stiffened, as in the Sabre-wings, *Sphenoproctus* and *Campylopterus* (1292). The shape of the tail, too, varies enormously, but all these differences in structure are best appreciated by a careful study of the comparative preparations exhibited on the tablet in the Case.

The small round, or sometimes purse-shaped, nest, generally composed of the down of plants, felted and covered with spiders' webs and soft lichens, is placed on a branch or suspended from a leaf. The eggs are white and one or two in number, and the young when hatched are blind and naked.

Among the more remarkable forms we may draw special attention to the Sword-billed Humming-bird (*Docimastes ensiferus*) (1298) with an enormously lengthened bill, which enables the bird to probe the long tubular flowers in search of tiny insects. *Eutoxeres* (1288) has the bill curved in almost a semicircle, and feeds on spiders which it catches in the crevices of trees and walls. *Ioddigesia mirabilis* (1309) is one of the rarest and most marvellous members of the family on account of its remarkable tail. In the female and young male ten rectrices or tail-feathers are present as usual, but in the adult male there are only four, a very small pair in the middle and a greatly elongate pair on the outside, which cross one another and end in a "racquet." This species was discovered in Northern Peru by a botanist named Matthews in 1836, and the single specimen then procured remained unique till, in 1881, the locality was rediscovered by M. Stolzmann. A number of specimens have since been brought to Europe.

Family XIV. COLIIDÆ. COLIES.

[Case 63.] The position of the Colies in the classification of birds has been much discussed, but it is now generally admitted that they should be placed among the *Coraciiformes*, and in close proximity to the Trogons.

The family includes only the genus *Colius* (1360-1363), with nine brownish or greyish crested species, all of which are natives of Africa, where they are known as Mouse-birds on account of their creeping habits. The plumage of the sexes is similar. All four toes are directed forwards, but the first can be turned backwards at will. They are all fruit-eaters, and live in small bands among the thick bushes, where they climb and creep about among the branches, the bill being used to aid

their movements. At night they roost in thickly-packed companies, hanging head downwards in a cluster in the most remarkable attitudes. The cup-shaped nest is placed in the thickest bushes a few feet from the ground, and the eggs are dull white, sometimes streaked with orange or brown.

Order XXVI. TROGONIFORMES. TROGON-TRIBE.

The birds constituting this very distinct Order are chiefly remarkable on account of the unique structure of the foot, in which the first and *second* toes are directed backwards and the third and fourth forwards.

Family TROGONIDÆ. TROGONS.

The single family (*Trogonidæ*) includes nearly fifty species, all birds [Case 63.] of bright plumage, some, such as the Quezal, being unsurpassed in brilliancy of colouring. The various genera are distributed over Africa, India, and the Indo-Malayan region, as well as Central and South America, where the majority of the species occur. That the Trogons are a very ancient type of bird-life and once inhabited the Palæarctic region, is proved by the discovery of the fossil *Trogon gallicus* in the Lower Miocene of France. Their plumage is of the softest description, and the skin of the body so delicate and thin that it resembles damp tissue-paper, and consequently these birds are the most difficult of all to preserve. They frequent the thickest forest, and are of rather sluggish habits, feeding chiefly on fruits and insects which are captured on the wing. The eggs, which are white tinged with bluish or buff, are deposited in a hole bored in some rotten stump or branch, and the young when hatched are said to be naked.

The most splendid member is the Quezal (*Pharomacrus mocinno*) (1365), from the highlands of Central America, with the upper wing- and tail-coverts greatly lengthened and forming brilliant metallic-green ornamental plumes. This species has been adopted as the national emblem of the Republic of Guatemala and figures on the postage-stamps of that country. Of the other South American genera we may mention the Cuban species *Prionotelus temnurus* (1368), with the plumage alike in both sexes and the tail-feathers deeply excised, and the many species belonging to the genus *Trogon* (1369-73), several of which are shown. In Africa the group is represented by three species belonging to the genus *Hapaloderma* (1374), and in the Indo-Malayan region by *Harpactes* (1375-77), and *Hapalarpactes* (1378).

Order XXVII. CUCULIFORMES. CUCKOO-TRIBE.

The birds comprising this Order form a fairly well-marked group, and are divided into two families, the *Cuculidæ* or Cuckoos, and the *Musophagidæ* or Turacos. In the former the foot is of the true zygodactylous type, with the first and fourth toes turned backwards and the second and third forwards; but in the Turacos the fourth toe is less completely reversed, and we find what is known as a semi-zygodactylous type, similar to that seen in the Madagascar Rollers.

Family I. CUCULIDÆ. CUCKOOS. (Plate XXI. fig. 1.)

[Case 64.] The *Cuculidæ* are a cosmopolitan family, feeding on insects and fruits, and specially interesting on account of the peculiar parasitic habits of many of the species, which impose the burden of hatching their eggs and rearing their young on other birds. One or more eggs are placed in the nest of some suitable foster-mother, whose own young are subsequently ejected by the young Cuckoo. Many Cuckoos, however, are not parasitic, but build their own nests and rear their young in the ordinary manner.

Six subfamilies are recognised; the first, including the true Cuckoos (*Cuculinæ*), are hawk-like birds and our common Cuckoo (*Cuculus canorus*) (1385) [Pl. XXI. fig. 1], from whose note the family derives its name, is the type. It is a summer-visitor to Great Britain, Europe, and Asia, migrating southwards in winter as far as Australia and South Africa. The female deposits her egg on the ground, and conveys it in her bill to the nest of the foster-parent, the latter being generally some insectivorous bird such as a Pipit, Wagtail, or Warbler, etc. The eggs laid by different individuals differ greatly in colour, and often resemble those of the host; the most remarkable type of egg is blue, and generally found in nests of the Redstart, when it is only to be distinguished by its greater size. The large Hawk-Cuckoo (*Hierococcyx sparveroides*) (1384) of the Himalaya and Eastern Asia closely resembles in appearance and flight a species of Sparrow-Hawk (*Accipiter virgatus*) found in the same countries. This resemblance is quite unexplained; but, as it is sufficient to cause great alarm to small birds in general, is possibly connected with the breeding-habits. Another well-known member is the so-called "Brain-fever-Bird" (*Cacomantis merulinus*) (1386).

A well-known European and African species is the Great Spotted Cuckoo (*Coccyzus glandarius*) (1382), a rare straggler to Great Britain. The host selected by this bird is usually a Magpie or Crow, and from four to eight eggs have been found in one nest. The Drongo-Cuckoos (*Surniculus*) (1383) are small black species closely resembling the

Drongos (*Dicrurus*) (see p. 133), in whose nests they are said to place [Case 64.] their eggs. The smallest members of the group are the beautiful little species of *Chrysococcyx* found in the Old World, and of these the Emerald Cuckoo (*C. smaragdineus*) (1387) of Africa is the most lovely. The hosts selected by these birds are Sun-birds and Finches. In America the subfamily is represented by the genus *Coccyzus*, the members of which are not parasitic but build their own nests, and are said to be most affectionate parents. The Yellow-billed Cuckoo (*C. americanus*) (1391) has on several occasions visited Great Britain. The Indian Koel (*Eudynamis honorata*) (1396) represents a fruit-eating Oriental genus in which the plumage of the sexes is unlike, the male being black and the female brown, variously barred, mottled and spotted with black and white. The eggs are greenish, blotched with grey and brown, and are placed in the nests of Crows. Lastly we must mention the extraordinary Channel-bill Cuckoo (*Scythrops novæ-hollandiæ*) (1398), with its great grooved bill, ranging from Celebes to Australia. This bird places its eggs in the nests of the Piping Crows. The Crow-Pheasants or Lark-heeled Cuckoos (*Centropodinae*) include but a single genus, *Centropus* (1392-1394), including more than thirty species ranging from Africa and Southern Asia to Australia. They are not parasitic, but make a large globular nest, generally with an entrance in the side, and may often be seen walking on the ground. The Common Coucal (*C. sinensis*) (1392) and several allied forms are exhibited.

The third subfamily, *Phœnicophainæ*, includes a number of non-parasitic forms, with very inferior powers of flight, inhabiting the thick bush of the Old and New Worlds, and spending much of their time on the ground. To this group belong the various American species of *Saurothera* (1399-1400), *Hyetornis* (1401), and *Piaya* (1402-1404), locally known as "Rainbirds"; the Malkohas of the genera *Zanclostomus* (1407), *Rhopodytes* (1407 a), *Phœnicophaës* (1408), *Rhamphococcyx* (1409-1410), *Rhinortha* (1405), and *Taccocua* (1406) from Eastern Asia and the neighbouring islands; the remarkable Philippine species *Dasylophus superciliosus* (1412) and *Lepidogrammus cumingi* (1413); and the various species of Madagascar Cuckoos (*Coua*), of which the blue species *C. carulea* (1415) is a striking example.

The fourth subfamily, *Neomorphinæ*, includes the large and handsome Pheasant-Cuckoo (*Carpococcyx radiatus*) (1416) from Borneo, the well-known Road-runner or Chaparral-cock (*Geococcyx mexicanus*) (1418), from the thinly wooded or barren plains of South-western N. America, and one or two other New World forms.

Diplopterus navius (1419) and *Dromococcyx phasianellus* (1420) represent the fifth subfamily *Diplopterinæ*, found in Central and South America.

Lastly the *Crotophaginæ*, also a New World group, includes the

White Anis (*Guira*) (1422) and the Black Anis (*Crotophaga*) (1421). The latter are remarkable on account of their nesting-habits, the females forming huge co-operative nests, in which they deposit their eggs and sit in company. The eggs are blue, with a peculiar overlying chalky incrustation.

Family II. MUSOPHAGIDÆ. TOURACOS.

[Case 63.] These birds, often called Plantain-eaters, and locally known as "Lowries," include about twenty-five species grouped in six genera. All are peculiar to the forests of Africa, generally frequenting the highest trees, and feeding on various fruits and insects. Like the Pigeons they build a flat nest of twigs, and lay rounded greenish- or bluish-white eggs. Many of the species are beautifully coloured, while others are mostly grey. To the former category belong the numerous species of *Turacus* (1425), and a few included in *Gallirex* (1428) and *Musophaga* (1429). All these birds have the flight-feathers mostly crimson and yield a peculiar pigment called Turacin, which contains copper and may be reduced to a powder. [See preparation in Case.] This is so soluble that the colour is washed out of the quills during heavy rains, though subsequently renewed. The green colour in these birds is also of peculiar interest, being due to the actual presence of green pigment in the feathers. This colour is not found in any other bird (see p. 143). The Violet Touraco (*Musophaga violacea*) (1429) represents the only species lacking a well-developed crest, but possesses an ornamental frontal shield somewhat similar to that found in the Common Coot. The Great Crested Touraco (*Corythæola cristata*) (1430), the largest member of the family, is also a very handsomely-coloured bird, but the species of *Schizorhis* (1431) and *Gymnoschizorhis* (1432), the two remaining genera, are dull-coloured and mostly of a grey or greyish-brown tint.

A remarkable fossil form (*Necornis*) occurs in the Middle Miocene of France, indicating that the family is one of great antiquity.

Order XXVIII. PICIFORMES. WOODPECKERS AND ALLIES.

[Cases 65-67.] The Toucans, Barbets, Honey-Guides, and Woodpeckers representing this Order possess many structural characters in common, such as their zygodactylous foot, with the first and fourth toes directed backwards and the second and third forwards.

Family I. RHAMPHASTIDÆ. TOUCANS.

[Case 65.] The Toucans are a large and brightly-coloured group, plentifully represented in the forests of Central and South America, especially in

the great wooded regions of Amazonia. They are easily recognised by the extraordinary shape and size of the bill, only rivalled by that of the Hornbills, and may be regarded as representing the latter birds in South America. In spite of its great bulk, the bill, though strong, is remarkably light, the thin external walls being supported by a delicate network of bony fibres, forming cells to which the air has constant access. They feed chiefly on fruit, varying this diet with insects, eggs, and young birds. The peculiar long, very slender tongue, with barbed edges, is not adapted for conveying food to the pharynx, and each morsel is swallowed by throwing back the head and allowing it to drop into the gullet. In spite of their zygodactylous feet these birds do not climb like the Woodpeckers, but jump from branch to branch after the manner of Hornbills. Not only the long, soft plumage, but the bill and naked parts of the face are ornamented with the brightest colours. When roosting, Toucans have a remarkable habit of raising the tail and bending it forwards over the back, as shown in the mounted example of the Orange-breasted Toucan (*Rhamphastos vitellinus*) (1439). They are able to assume this position owing to the perfect ball-and-socket articulation of the caudal vertebræ. About sixty species are recognised and grouped into the five genera *Rhamphastos*, *Andigena* (1440-1442), *Pteroglossus*, *Selenidera*, and *Aulacorhamphus*, and all, so far as is known, deposit oval white eggs in the hollow limbs of tall trees; the young are hatched naked. The largest members belong to the genus *Rhamphastos*, of which *R. toco* (1436) is one of the most robust, and the most brilliant are the Aracarís (*Pteroglossus*) (1443-1449). The members of the genus *Selenidera* (1450-1451) are remarkable in having the plumage differently coloured in the male and female, and the Green Toucans (*Aulacorhamphus*) (1452-1455) are at once recognisable by their uniform style of plumage, which imitates the colour of the forest-leaves.

Family II. CAPITONIDÆ. BARBETS.

The members of this family are small, rather heavily-built birds, with [Case 65.] a large stout bill, usually beset with strong black bristles, and generally with brilliantly-coloured plumage. They inhabit the forests and well-timbered districts throughout Tropical Asia, Africa, and America, and are strictly arboreal in their habits, hopping from branch to branch, and sometimes climbing up and down the trunk in search of insects. In their habits they are remarkably inactive, and often sit motionless for hours at a time, uttering their noisy ringing note, which may be heard at intervals throughout the day and on moonlight nights. In some species the sound is singularly metallic, and has gained for them such appropriate names as "Copper-smith" (*Xantholæma hamato-*

cephala) (1474), "Tinker-bird" (*Barbatula pusilla*) (1464), and "Iron-smith" (*Cyanops*) (1471-1473). Fruits, buds, and insects form their principal food, but in captivity they will eat meat or small birds. From three to five oval white eggs are laid in a hole in a soft-wooded or dead tree excavated by the birds, who cut a neat circular entrance similar to that made by the Woodpeckers. More than a hundred species are recognised and are grouped into some twenty genera, nearly all of which are represented in the Case.

Among the more striking we may draw attention to the tooth-billed forms such as *Pogonorrhynchus dubius* (1456), with the base of the bill hidden by dense tufts of bristles, and its allies belonging to the genera *Lybius* (1457, 1458), and *Tricholæma* (1459, 1460). In all the other genera the edge of the upper mandible is entire. An exception to the gaudy plumage and striking contrasts in colour is found in the West African forms *Gymnobucco calvus* (1461), with its curious bare head, and *Heliobucco bonapartei* (1462); also in *Calorhamphus hayi* (1466) from the Malay Peninsula; all three are birds of singularly plain appearance. One of the largest is the Great Himalayan Barbet (*Megalæma marshallorum*) (1467), and the most brilliantly coloured members are found in the Oriental genus *Cyanops* (1471-1473) and the South American *Capito* (1480-1484), which are remarkable in having the plumage of the sexes different.

Family III. INDICATORIDÆ. HONEY-GUIDES.

[Case 65.] This small family of dull-coloured birds includes about a dozen species mainly confined to Africa; but two species occur in the Oriental region, one inhabiting the Himalaya, and the second the Malay Peninsula and Borneo. The popular name is derived from the curious habit of certain African species, which lead men to bees' nests for the sake of sharing the spoil. On observing a man the bird comes fluttering from branch to branch, uttering a shrill cry to attract attention, and, if followed, gradually leads him to a nest of bees, its object being to obtain the portions of the comb containing the grubs. The two Oriental species are not known to share this peculiar habit; but, so far as is known, the food of all the Honey-Guides consists of Hymenoptera. The white eggs are deposited in a hole in the stem or branch of a tree, and the birds are said to utilise the old nest-hole of a Barbet or Woodpecker for the purpose. The species of *Indicator*, of which the Common Honey-Guide (1486) is a well-known example, have a stout, rather finch-like bill, while in *Prodotiscus regulus* (1488) and its allies it is more slender and pointed.

Family IV. PICIDÆ. WOODPECKERS. (Plate XXII.)

This large and important family of scansorial birds with zygodactylous feet, including nearly four hundred species, ranges over almost the whole of the temperate and tropical regions of the world, but is absent from Madagascar, Polynesia, and Australia. It is divided into three subfamilies: the true Woodpeckers (*Picinæ*), the Piculets (*Picumninæ*), and the Wrynecks (*Iynginæ*). The bill is generally strong and wedge-shaped and modified into a powerful cutting weapon. With the chisel-like tip of the upper mandible propelled by the powerful neck-muscles, the bird can cut away the bark of trees to look for insects, open with ease hard-shelled fruits such as nuts, and make deep holes in the trunks or branches for its nest. In the ground-feeding forms, such as the species of *Colaptes* (1490), the bill is more curved. The tongue is excessively long and vermiform, pointed and barbed at the tip and capable of great protrusion; it is supplied with sticky mucus from the large salivary glands, which causes insects and their larvæ and eggs to adhere to it. In nearly all the cornua or "horns" of the hyoid bone which supports the tongue are of enormous length, and slide round the skull, passing in a muscular sheath from the side of the gullet round the occiput to the base of the upper mandible. This extraordinary structure is well shown in the preparations of the head of the Green Woodpecker (*Gecinus viridis*) (1496, 1497) exhibited in the Case. [Case 66.]

The eggs are round and glossy, and the young when hatched are naked.

The subfamily *Picinæ* includes the great bulk of the species, distinguished by having the tail composed of stiff pointed feathers which support the bird when climbing. Of the species which feed on the ground, examples will be found in *Geocolaptes olivaceus* (1489) of S. Africa, and the Golden-winged Woodpecker or Flicker (*Colaptes auratus*) (1490) of N. America. The genus *Gecinus* includes a number of nearly allied species, the most familiar being the Green Woodpecker or "Yaffle" (*G. viridis*) (1492), a common resident in many parts of England and Wales, and ranging across Europe to Persia. It feeds largely on ants, and may frequently be seen on the ground. Lewis's Woodpecker (*Asyndesmus torquatus*) (1494), of Western N. America, is remarkable in having the feathers of the collar and underparts with the barbs disconnected. [See preparation.] Another handsome American genus is *Melanerpes* (1507-1510), of which five types are shown, the Ant-eating species (*M. formicivorus*) (1521), exhibited on the floor of the Case, being depicted in the act of laying up its winter store of nuts which it places in holes in the bark. The Rufous Woodpecker (*Micropternus phæocephus*) (1502), from South-eastern Asia, represents a

[Case 66.] peculiar type of coloration. The large genus *Dendrocopus* is represented in England by two species, the Greater Spotted Woodpecker (*D. major*) (1518) [Pl. XXII.] and the Lesser Spotted Woodpecker (*D. minor*) (1522), the latter being shown with its nesting-hole on the floor of the Case. Another species, which is said to have been twice procured in England, is the American Hairy Woodpecker (*D. villosus*) (1523). Two well-known European birds are the Three-toed Woodpecker (*Picoides tridactylus*) (1524), representing a genus in which the first toe is wanting, and the Middle Spotted Woodpecker (*Dendrocoptes medius*) (1520), noteworthy as having the sexes almost alike in plumage, the crown of the female being only slightly less brilliant in colour. The smallest members of the *Picinae* belong to the genus *Iyngipicus* (1525), and among the largest forms will be noted the Great Black Woodpecker (*Picus martius*) (1513) of N. Europe, the still larger Ivory-billed Woodpeckers of America, of which the Mexican species (*Campophilus imperialis*) (1511) is shown, and the Great Slaty Woodpecker (*Hemilophus pulverulentus*) (1495) from the Indo-Malayan countries.

The second subfamily *Picumninae* includes about forty very small Woodpeckers known as Piculets, with the tail-feathers very short and rounded. They are distributed over Central and South America, West Africa, and the Indian region. Representatives of two of the four genera recognised will be found in Hargitt's Piculet (*Picumnus undulatus*) (1515) from Guiana, and the Rufous Piculet (*Sasia ochracea*) (1514) from North India and Burma, the latter possessing only three toes, the first being absent.

Of the Wrynecks, representing the third subfamily *Iynginae*, four species are known, all included in one genus, *Iynx*. They are characterised by their long tail, composed of soft flexible feathers, and by their mottled plumage somewhat similar to that of the Nightjar. The Common Wryneck or "Cuckoo's-mate" (*I. torquilla*) (1516), a well-known summer-visitor to Great Britain, is found throughout almost the whole of Europe and Asia and migrates southwards in winter to India and Africa. As a nesting-site it makes use of any convenient hole in a tree, or occasionally in an earth-cutting or sand-bank. Its food, which consists largely of ants, is mostly procured on the ground. The other species, one of which (*I. pectoralis*) (1517) is shown, are confined to Africa and have the fore-neck and chest rufous.

Family V. BUCCONIDÆ. PUFF-BIRDS.

[Case 67.] The Puff-birds are mostly dull-coloured birds, and natives of Central and South America. They differ from the Woodpeckers in various anatomical characters, and may be recognised externally by their stout

curved bill, hooked at the tip in the genus *Bucco* (1537-44), and thickly beset with bristles. There is no aftershaft to the contour-feathers. They inhabit the dense forests, and are said to resemble Bee-eaters or Flycatchers in their habits, most of the insects on which they feed being captured on the wing. Very little is known of the nesting-habits, but the Swallow-wing (*Chelidoptera tenebrosa*) (1532) is known to breed in holes in banks and lay white eggs. More than forty species are recognised and grouped into seven genera, and representatives of four of these are exhibited in the Case.

Family VI. GALBULIDÆ. JACAMARS.

The distribution of this family, like that of the nearly allied *Bucco-* [Case 67.] *nidæ*, is Central and South American. In general appearance they resemble the Bee-eaters. The bill is long, slender and pointed, the plumage often metallic, and the contour-feathers have an aftershaft. The feet are zygodactylous, and in the genus *Jacamaralcyon* (1554) the hind toe is absent. Their habits and mode of feeding are very similar to those of the Puff-birds, but the Jacamars more often frequent the outskirts of forests in the neighbourhood of streams. They nest in holes in banks, and possibly in holes in stumps, and lay white eggs. About twenty species are known, belonging to six genera, all of which will be found represented. All belong to the subfamily *Galbulinæ* except the Great Jacamar (*Jacamerops grandis*) (1556), which, on account of its curved bill and other structural characters, is placed in a second subfamily, *Jacameroperinæ*.

Order XXIX. EURYLÆMIFORMES.

The members of this Order appear to form a connecting-link between the Picarian birds and the Passeres. They resemble the latter in having the palate ægithognathous and in other anatomical characters, but differ in having the deep plantar tendons which serve the toes united by a vinculum or band, the hind toe being thus incapable of independent action. Only one family is recognised.

Family EURYLÆMIDÆ. BROAD-BILLS.

As their name implies, these birds are characterised by their broad flat bill. They inhabit the forests of South-eastern Asia and the adjacent islands, feeding mostly on insects, or, in some cases, on berries and fruits, and leading a quiet inactive existence. The nest—a large oval structure, composed of grass, moss, and fibres—has an opening at the side and is suspended from a thin branch. The eggs are white or

cream-coloured, and in some species heavily spotted towards the larger end.

To the subfamily *Calypptomeninae* belong three beautiful species with the nostrils hidden by the erect frontal plumes and the plumage mostly vivid green. All three are represented in the Case; *Calypptomena whiteheadi* (1559), the largest, and *C. hosei* (1560), with its bright blue breast, both very rare birds, being peculiar to the highlands of Borneo, while the smaller *C. viridis* (1561), a pair of which are mounted with their nest, is more widely distributed in the Indo-Malayan region.

The second subfamily, *Euryleminae*, includes a number of handsome forms, such as Horsfield's Broad-bill (*Eurylemus javanicus*) (1563), the Long-tailed Broad-bill (*Psarisomus dalhousiae*) (1566), and the sombre-coloured Dusky Broad-bill (*Corydon sumatranus*) (1567), with its remarkably wide flattened bill like that of a Frog-mouth. The Black-and-Red Broad-bill (*Cymborhynchus macrorhynchus*) (1565) is shown with its large globular nest made of grass.

Order XXX. MENURIFORMES.

The remarkable Australian forms constituting this Order have usually been associated with the Passeres, but differ in various anatomical points and the nestling is covered with dense down. Only one family is known.

Family MENURIDÆ. LYRE-BIRDS. (Plate XXIII. fig. 1.)

[Case 67.] The three large species of *Menura* (1568) included in this family are all natives of Australia and inhabit the precipitous rocky gullies in thick forests with tangled undergrowth, feeding on mollusca, worms, beetles, and other insects. They are remarkable for their immensely developed legs and feet, with long, stout, slightly curved claws, with which they scratch up the soil like Game-birds in search of insects, and for the extraordinary shape and structure of the tail-feathers in the male, the outer pair being curved like a lyre. In the female the tail is long and normally shaped. The natural cry is a loud liquid gurgling sound, but these birds also possess great powers of reproducing the song and calls of other birds and animals, or any other sound they may hear. The oval domed nest (1569), placed sometimes on the ground, sometimes on trees, contains one large egg, blotched and marked with purplish-brown.

Order XXXI. PASSERIFORMES. PERCHING-BIRDS.

This Order, comprising the rest of the living members of the class Aves, includes between five and six thousand species, nearly all being birds of small size. [Cases 68-84.]

The feet are adapted for perching, three of the toes being directed forwards and one backwards. The front toes are generally separate from one another to the base. The hind toe is long, inserted low down and moved by a separate tendon from that which serves the front toes, so that it is capable of being powerfully opposed to them, like a thumb. The palate is ægithognathous, the vomer being broad and truncate and the maxillo-palatine bones separate from one another (Appendix, p. 145). This arrangement of the deep plantar tendons of the foot, which is termed "passerine," combined with the ægithognathous palate, is characteristic of the Order.

Passerine birds are divided into two sections, the *Acromyodi* or Singing-Birds, and the *Mesomyodi* or Songless Passeres. This division, however, is based on the anatomical structure of the syrinx or lower larynx, in which the voice is produced, rather than on the actual power of producing melodious notes in a certain sequence. In the *Acromyodi* the intrinsic muscles of the syrinx are complex and consist of numerous pairs fixed to the *ends* of the bronchial semi-rings; while in the *Mesomyodi* the muscles are simple, consisting in many cases of only one pair, inserted into the *middle* of the bronchial semi-rings (Appendix, p. 148).

All our song-birds belong to the Acromyodian group, but there are numerous Passerine birds possessing the less complicated Mesomyodian apparatus which can utter notes more deserving of the term song than some, such as the Crows, referred to the former division.

Section A. MESOMYODI. SONGLESS BIRDS.

The Mesomyodian Passeres are further divided into two groups—*Tracheophonæ* and *Oligomyodæ*—the former having the lower end of the trachea modified to form an organ of song, while in the latter the reverse obtains.

Group I. TRACHEOPHONÆ.

Four families are recognised, characterised by the shape of the sternum and by the structure of the tarsal scutes. In the *Pteroptochidæ* and *Conopophagidæ* the sternum has four posterior notches, in this respect differing from all other Passeres; while in the *Formicariidæ* and *Dendrocolaptidæ* there are only two notches.

Family I. PTEROPTOCHIDÆ. TAPACOLAS.

[Case 68.]

These small Wren-like birds, characterised by their large robust feet with straight claws, range from Costa Rica through South America to Patagonia and the Falkland Islands, and occur up to an altitude of 9000 or 10,000 feet. They are shy and retiring in their habits, hiding themselves in thick cover, where they hop actively from bough to bough, or run like mice on the ground, the tail being carried in an elevated position, which adds to their general Wren-like appearance. Little is known of their nesting-habits, but in some forms the nest is made of grass or moss and placed near the ground, while others, such as *Pteroptochus* (1570) and *Hylactes* (1571-2), are reported to nest in burrows.

Rather more than twenty species are recognised and grouped into eight genera, some of which will be found represented in the Case.

Family II. CONOPOPHAGIDÆ. CONOPOPHAGAS.

[Case 68.]

About a dozen species, all found in South America, comprise this family. The species of *Conopophaga* (1577) and *Corythopsis* (1578), the two genera recognised, are very imperfectly known, and nothing appears to have been recorded concerning their habits.

Family III. FORMICARIIDÆ. ANT-BIRDS.

[Case 68.]

This large and characteristic South-American group of about 260 species is chiefly confined to the tropical forests of the north, ranging thence in diminishing numbers to Central America, Chile, and Argentina. They are mostly birds of very retired habits, creeping silently about among the lower branches or searching for insects and their larvæ on the ground in the densest and thorniest thickets. Though commonly known as "Ant"-birds, it is now believed that they do not feed on ants, but on the insects driven up by the swarms of foraging ants.

The nesting-habits are very imperfectly known, but some build on or near the ground and lay white or variously coloured spotted eggs.

The species vary greatly in outward appearance, and are divided into three subfamilies, viz.:—*Thamnophilinæ*, or Ant-Shrikes, which have the strong hooked bill toothed at the extremity, and greatly resemble the true Shrikes (*Lanius*, etc.) both in appearance and habits; *Formicariinæ*, which recall Thrushes and Warblers; and the long-legged *Grallariinæ*, which look like the Pittas except in coloration.

Among the more notable forms of the *Thamnophilinæ* we may call attention to the giant of the group, *Batara cinerea* (1580), with its formidable hooked bill, no doubt used for the destruction of smaller birds as well as large insects, and *Neotantes niger* and *Clytctantes alixi*, two abnormal types with curious upturned bills.

The numerous genera of the *Formicariinæ* are difficult to define, and merge into one another. The larger species have a Thrush-like aspect, while the smaller and more delicate forms have more the appearance of Warblers and Wrens, and all spend the greater part of their lives on the ground. *Pithys albifrons* (1598) is remarkable for its crested head and lengthened throat-feathers.

The *Grallariinæ* (1606-9) are easily recognised by their long legs and short tail. They are entirely terrestrial in their habits, and resemble the Pittas in form and the Ground-Thrushes in their style of coloration.

Family IV. DENDROCOLAPTIDÆ. WOOD-HEWERS.

The Wood-Hewers form another large and typical South-American [Case 68.] group, including about 280 species of birds of small size. They are dull-coloured, the prevailing tint of the plumage being brown, while in a large proportion of the species the tail is uniform chestnut. Five subfamilies are recognised, the *Dendrocolaptinæ* and *Sclerurinæ* being characterised by the stiff spiny shafts of the tail-feathers and by having the outer toe more or less connected with the middle toe, while in the *Philydorinæ*, *Synallaxinæ*, and *Furnariinæ* the shafts of the tail-feathers are soft or not very spinous and the outer toe is free.

The subfamily *Dendrocolaptinæ* includes a number of scansorial species resembling Woodpeckers and Tree-creepers in outward appearance as well as in their habits. Their short legs and large feet armed with sharp claws and their stiff spiny tails enable them to run up the stems of the tree-trunks in search of insects, and their white eggs are deposited in holes. The larger forms, such as *Xiphocolaptes major* (1610), *Nasica longirostris* (1612), and *Dendroplex picus* (1621), with its straight pointed bill, are very like Woodpeckers; while *Xiphorhynchus procurvus* (1614) and *X. trochilirostris* (1615), with their long, slender, curved bills, are typical of the Creeper-like forms, and *Glyphorhynchus cuneatus* (1617), with its short, stout, upturned bill, has more the appearance of a Nuthatch.

The second subfamily, *Sclerurinæ*, includes half a dozen spiny-tailed species of the genus *Sclerurus* (1618), with somewhat longer legs and terrestrial habits.

Of the *Philydorinæ*, which include a number of bush-hunting forms, we may call special attention to the "Firewood Gatherer" (*Anumbius acuticaudatus*) (1652), shewn with its nest on the floor of the Case. The nest is a bulky structure built of sticks, with an entrance at the top and a spiral passage leading down to the nesting-chamber, which is lined with grass and usually contains five white eggs. It is generally placed on isolated trees, but sometimes, as in the present instance, the cross-arms of a telegraph-post are selected as a site, which greatly interferes

[Case 68.] with the working of the lines. *Xenops rutilus* (1629) is a curious little form, worth noting on account of its much compressed, upturned bill.

The Warbler-like *Synallaxis* embrace a number of small forms frequenting the bushes and low undergrowth, and are interesting on account of their remarkable nesting-habits. Some of the species of the genus *Synallaxis* (1631-6) make enormous nests of sticks and twigs, lined with hairs and feathers etc., large enough to fill an ordinary wheelbarrow, and generally divided into two chambers united by a passage. More than one of these great structures may often be found in the same tree. The species of *Siptornis* (1637-8) have very similar habits. Another member, the Thorn-tailed Warbler (*Oxyurus spinicauda*) (1642), has the shafts of the tail-feathers stiffened and bare towards the tips.

The last subfamily, *Furnariinæ*, includes a number of soft-tailed terrestrial species. The most curious nests of all are the oven-shaped clay structures built by the Oven-birds (*Furnarius*) (1651), and usually placed in the most exposed situations, such as the top of a post or on a bare rock. Although the eggs may not be laid till September or October, the birds often begin to build in the middle of June, and may be found at work in any month of the year. The winter-built nests are said to be the best and to withstand the rain and heat for a year or more. As the clayey mud of which they are composed becomes almost as hard as brick, it is no easy matter to break in and extract the eggs. *Geositta cunicularia* (1649), reminding us of a Wheatear in appearance and habits, is also worthy of note. It excavates a burrow from 2 to 6 feet long, terminating in a round cavity lined with soft grass, in which four or five white eggs are deposited.

Group II. OLIGOMYODÆ (p. 107).

Family I. COTINGIDÆ. AMERICAN CHATTERERS.

[Case 69.] This important family contains more than 100 species of fruit-eating birds, distributed over Tropical America from South Mexico to the northern borders of Argentina. The habits of these woodland birds are very imperfectly known, but in some species at least their diet is supplemented by molluscs, insects, and even lizards. Six subfamilies are recognised. The *Gymnoderinæ* are rather large birds with a Crow-like bill, and include such remarkable forms as the Umbrella-birds (*Cephalopterus*) (1659 60) and the Bell-birds (*Chasmorhynchus*), in which the extraordinary ornamental appendages are especially remarkable. The males of the black Umbrella-birds, so called on account of their peculiar umbrella-like crest, have a long cylindrical or flattened plumed wattle hanging down from the throat. This ornament is much less developed in the females, which are otherwise

very similar in appearance. The common Bell-bird or "Campanero" (*C. niveus*) (1654) carries on its forehead a long fleshy erectile appendage, ornamented with short white feathers; while *C. tricarunculatus* (1655) has three long vermiform wattles, one on the base of the bill and two lateral ones at the angles of the gape, and *C. variegatus* (1657) has the naked throat covered with a beard of long straggling bristles. Only the male Bell-birds bear these ornaments. Their note is loud and clear, like the sound of a bell, and in the stillness of a tropical evening may be heard at a distance of several miles. Other striking forms are the bare-necked *Gymnoderus fœtidus* (1658), which has a decidedly vulturine appearance, the naked-faced *Gymnocephalus calvus* (1661), the handsome crimson *Hæmatoderus militaris* (1662), and the great *Pyroderus scutatus* (1664), one of the largest members of the group.

The second subfamily, *Cotinginæ*, includes a number of birds of brilliant plumage, notably the members of the genus *Cotinga*, of which *C. cayana* (1674) and *C. cineta* (1675) are striking examples; the dark crimson *Xipholena pompadora* (1665), the curious swallow-tailed *Phibalura flavirostris* (1676), and the diminutive species of *Iodopleura* (1669-70), the smallest birds of the group.

To the third subfamily, *Rupicolinæ*, belong the splendid Cocks-of-the-Rock (*Rupicola*) (1680-2), with their extraordinary compressed crest, and the Red Chatterers (*Phænicocercus carnifex*) (1683). In the males of the former the end of the first flight-feather is curiously attenuated, while in the latter the fourth flight-feather is shortened and terminates in a horny filament. In the breeding-season the males of *Rupicola* have been observed by Schomburgk to dance with outspread wings and leap into the air before an assembled flock of their kind, much after the manner of Blackgame. The nest of mud and sticks is fastened to the rocky projections of caves, and the eggs are buff spotted with reddish-brown and lilac.

Attila thamnophiloides (1684) represents the subfamily *Attilinæ*, a dull-coloured group with a strongly hooked bill; and the fifth subfamily, *Lipauginæ*, an equally sombre-coloured assemblage, includes the genera *Lathria* (1685), *Aulia* (1686-7), and two others.

The sixth subfamily, *Tityrinæ*, is worth noting on account of the excessively short second flight-feather characteristic of the males of the group. Examples will be found in *Tityra cayana* (1688), *Hadrostomus aglaia* (1689), and *Pachyrhamphus viridis* (1690).

Family II. PIPRIDÆ. MANAKINS.

This family comprises about 70 small species, closely related to the *Cotingidæ*, but distinguished by the different scaling of the tarsi and by having the outer and middle toes more closely bound together at the [Case 69.]

[Case 69.] base. They inhabit the dense forests or thick undergrowth of Central and South America, and resemble Tits in their habits; but their food consists of fruits, berries, and seeds rather than insects, and their shallow nests are suspended from the branches of low shrubs. Two subfamilies are recognised—the *Piprinae*, including the smaller species in which the sexes are usually dissimilar, the males being brilliantly coloured and the females dull, and the *Ptilochlorinae*, birds of large size, mostly with dull plumage. Among the *Piprinae* we may call attention to *Chloropipo flavicapilla* (1693), with its elongate wings and tail, to *Cirrhopipra filicauda* (1698), with the shafts of the tail-feathers ending in long stiff filaments, to the members of the genera *Metopia* (1695) and *Masius* (1696–7), with their erect frontal plumes, and to the numerous species of brilliantly coloured *Pipra* (1700–5). *Macharopterus deliciosus* (1707) is remarkable for the extraordinary structure of the secondary flight-feathers in the male, and *Chiroxiphia linearis* (1707a) for the thickened shafts of the primary quills and the greatly lengthened middle tail-feathers. The allied *C. caudata* (1708) is known in Brazil as the “Dansador” or “Fandango-bird,” on account of its peculiar habit of dancing. When several individuals are assembled together, one often sits and pipes, while the remainder dance up and down to the music. When the musician becomes exhausted, he joins the dancers, and another takes his place. Of the *Ptilochlorinae* examples will be found in *Ptilochloris squamatus* (1716) and the sombre-coloured *Heteropelma turdinum* (1714).

Family III. OXYRHAMPHIDÆ. SHARP-BILLS.

[Case 70.] The three representatives of this family belong to the genus *Oxyrhamphus* (1719), found in Central and South America. They are easily distinguished from the *Tyrannidæ* by the straight sharp-pointed bill and by the strongly serrated outer web of the first primary quill in the male.

Family IV. TYRANNIDÆ. TYRANT-BIRDS.

[Case 70.] This large and much varied group, numbering over 400 species, is entirely restricted to the New World, and is distributed over every part, except the extreme north, in greater or less abundance. Some of the species are migratory, breeding in North America and wandering south in winter to Central and South America. They appear to take the place of the Flycatchers (*Muscicapidæ*) of the Old World, and, as in these birds, the majority have the bill greatly flattened and beset with bristles. From the other Oligomyodian families of the Mesomyodian Passeres they are distinguished by the scaling of the tarsi and by having the toes nearly free, as in the typical Passerine groups.

The name "Tyrant" is specially applicable to the larger birds of this group, on account of their pugnacious disposition, and they frequently attack other birds, often of superior size and strength. They are mostly clad in dull colours, but a few are ornamented with erectile crests, as in *Muscivora* (1758), or brilliantly coloured, as in *Pyrocephalus* (1761).

Four subfamilies have been recognised, the first being the *Teniopterinae*, which includes a number of dull-coloured grey and black species. The most noteworthy form, on account of its abnormal tail, is *Alectrurus tricolor* (1732), from the Pampas district of South America, and the Yiperu (*Cybernetes yetapa*) (1733), one of the largest forms, has a very long and deeply forked tail.

The second subfamily, *Platyrhynchinae*, embraces a number of small Flycatcher-like birds with flattened bills and dull olive-coloured plumage. Among the examples shown we may draw attention to the crested form *Colopterus galeatus* (1736), in which the outer flight-feathers of the male are curiously abbreviated, and to *Euscarthmus gularis* (1774), which, with its dome-shaped nest with the entrance at the side, is to be found on the floor of the Case.

The *Elaineinae*, or Olive Tyrants, form a third subfamily, with the bill more compressed and the bristles at the base much less developed. The general colour of the species is olive-green or sombre brown, in harmony with the dense forests to which they mostly resort, and the majority have an orange or red vertical spot on the top of the head. The bright-tinted reed-frequenting *Cyanotis azarae* (1743) is an exception both in colour and habits. *Elainea ridleyana* (1776) and its near allies build a small cup-shaped nest of moss and lichen; while *Myiozetetes similis* (1778) makes a loosely-constructed domed nest of fibre with an entrance at the side. These will be found on the floor of the Case. The largest species is *Myiodynastes bairdi* (1751), a bird about the size of a Thrush.

Of the fourth subfamily, *Tyranninae* (which includes all the largest members of the family, with flattened bills and well-developed bristles), the most remarkable are the long fork-tailed species *Milvulus tyrannus* (1772) and *M. forficatus* (1773); the King-Tyrant (*Muscivora regia*) (1758), with its tiara-like crest of orange feathers tipped with shining purple; and the scarlet-plumaged *Pyrocephalus rubineus* (1761), representing the only brilliantly coloured genus of the *Tyranninae*.

Family V. PHYTOTOMIDÆ. PLANT-CUTTERS.

The few Finch-like species of the genus *Phytotoma* (1780-1) included in this family are all natives of South America. They are [Case 70.]

interesting as representing the Finches among the Mesomyodian Passeres, and closely resemble those birds in their habits and mode of nesting. In young plantations they are said to do much damage with their strongly serrated bills, cutting off plants close to the ground with no apparent object.

Family VI. PITTIDÆ. PITTAS OR ANT-THRUSHES.

[Case 70.] With the exception of the three species which inhabit Africa, the fifty long-legged thrush-like species comprising this family are natives of the Oriental and Australian regions. Almost all the species of *Pitta* (1782-96) are birds of brilliant plumage, and some have supplementary ornamental plumes on the head and neck, as in *Anthocichla phayrii* (1797). They frequent the densest jungle and scrub, and are chiefly terrestrial in their habits, their long legs enabling them to hop with great agility and escape with speed at the slightest alarm. Molluscs, insects, and worms form their principal food, and are searched for among the fallen leaves. The nest is a round open structure placed on the ground or in a very low fork, and the eggs are creamy-white spotted with red or purplish-black.

Family VII. PHILEPITTIDÆ. WATTLED ANT-THRUSHES.

[Case 70.] The sole representatives of this peculiar family are two species of *Philepitta* (1799), found in Madagascar. They appear to be most nearly allied to the Pittas (*Pittidæ*), but differ in various particulars of their structure, such as the naked orbits surmounted by the fleshy wattle in the male, and the scaling of the tarsi. They appear to be entirely terrestrial in their habits.

Family VIII. XENICIDÆ. NEW-ZEALAND BUSH-WRENS.

[Case 70.] The members of this family are distinguished by various anatomical characters, the arrangement of the syringeal muscles being Mesomyodian. These tiny Wren-like birds are peculiar to the highland forests of New Zealand. The three known genera, *Xenicus*, *Acanthidositta*, and *Traversia*, include five species only. The Rifleman (*A. chloris*) (1800) is almost entirely arboreal in its habits, actively searching the trees for insects, and places its bottle-shaped nest in holes in trees and in other cavities, laying from three to five white eggs.

Section B. *ACROMYODI*. SINGING-BIRDS (p. 107).Family I. *ATRICHORNITHIDÆ*. SCRUB-BIRDS.

Only two small Australian species of the genus *Atrichornis* (1801) [Case 71.] are included in this family, peculiar among Passerine birds in having the clavicles (merry-thought) rudimentary. The wings are so small that the powers of flight are limited, and they live among the dwarf-ferns and dense thickets, where they are only to be detected by their loud note.

Family II. *HIRUNDINIDÆ*. SWALLOWS.

This well-defined cosmopolitan family, formerly associated with the Swifts (*Cypselidæ*) on account of their similarity in general appearance and habit of hawking insects on the wing, are now recognised as belonging to the Passerine Birds. The long powerful wings, feebly developed feet, small flattened bill and wide gape are the most striking external features, possessed in common with the Swifts; but the latter may always be distinguished by having 10 instead of 12 tail-feathers. The anatomical differences between the two families are many and striking. Many of the Swallows breed in colonies, and two or even three broods are reared in a season. About 116 species are recognised and divided into two subfamilies—the *Hirundininae*, including the true Swallows and Martins, and the *Psalidoprocniinae*, or Rough-winged Swallows (1815), in which the outer margin of the first flight-feather is provided with hooked barbs.

Of the former the Common Swallow (*Hirundo rustica*) (1808) is typical, and one of the most familiar and beloved of our summer visitors. It ranges north in summer over Europe and Asia, extending beyond the Arctic Circle, and winters in South Africa and the Malay Peninsula. Many other species are equally migratory, and traverse immense distances on their periodical journeys. The Red-rumped Swallow (*H. rufula*) (1808 a) has been recorded from Kent as an accidental visitor. Two other well-known visitors to the British Islands are the House-Martin (*Chelidon urbica*) (1802), which builds mud-nests under the eaves of houses and on the ledges of cliffs, and is easily recognised by its feathered toes; and the Sand-Martin (*Cotile riparia*) (1805), which excavates a tunnel in a bank terminating in a nesting-chamber. Both these birds lay pure white eggs, but those of the Swallow are spotted with reddish-brown and lavender-grey.

Family III. *MUSCICAPIDÆ*. FLYCATCHERS.

This somewhat vaguely defined family includes a very large number [Case 71.] of insect-eating species peculiar to the Old World, and may generally be

recognised by their flattened bill beset with bristles. Some of the forms included in the Flycatchers, such as *Cryptolopha* (1846) and *Poliophtila* (1851), might well be placed in the Warblers (*Sylviidæ*), and it seems doubtful if any real line can be drawn between the two families, while the mottled or squamated plumage of the nestling seems to indicate a close relationship to the Thrushes (*Turdidæ*). One of the best known is the Common Spotted Flycatcher (*Muscicapa grisola*) (1828), one of our later summer-migrants, which arrives from Africa in May. It feeds solely on insects captured on the wing, the bird darting at them from some branch, to which it again returns for a fresh sally. Another less numerous summer-visitor is the Pied Flycatcher (*M. atricapilla*) (1827), while the Red-breasted Flycatcher (*M. parva*) (1829) is an occasional visitor from Eastern Europe and Asia. The Brown Flycatcher (*Alseonax latirostris*) (1830) is said to have occurred in Kent. Among the more striking exotic forms we may mention the Australian "Robins," *Petroica phænicea* (1831) and *P. rhodinogaster* (1832), with their scarlet and pink breasts; the lovely Narcissus-Flycatcher (*Xanthopygia narcissina*) (1841), from China and Japan; the Paradise-Flycatchers (*Terpsiphone*) (1866), with the middle pair of tail-feathers greatly lengthened in the male; the numerous species of *Rhipidura* (1853-6), with wide fan-shaped tails, which are frequently outspread as they dance from branch to branch, and their remarkably neat cup-shaped nests, several of which are exhibited on the floor of the Case; the Australian Restless Flycatcher (*Sisura inquieta*) (1874), known to the colonists as the "Grinder," on account of the peculiar grinding note which it utters while hovering in the air like a kestrel before descending on its prey; and, lastly, the Niltavas (1863-5), with their brilliant plumaged males, said to be less typical in their habits and to eat berries.

FAMILY IV. CAMPOPHAGIDÆ. CUCKOO-SHRIKES.

[Case 71.] The members of this Old-World family seem to constitute a link between the Flycatchers and the Shrikes, and, as in the latter family, the plumage of the nestling is cross-barred and not mottled or squamated. They are chiefly distinguished by the spiny character of the rump-feathers, and the majority possess a strong hooked bill. A remarkable form, the Pheasant Cuckoo-Shrike (*Pteropodocys phasianella*) (1875), with a long forked tail and stout legs, is a native of Australia, and lives chiefly on the ground. Other larger forms of a somewhat similar type belonging to the genera *Graucalus* (1876, 1877), *Artamides* (1878, 1879), and *Campophaga* (1882, 1883) are arboreal and feed on insects which they pick off the leaves. The most attractive members of the family are the Minivets (*Pericrocotus*) (1884, 1888), mostly birds of brilliant plumage, the predominant colour of most of the males being scarlet and

of the females yellow. The numerous species inhabit the wooded regions of India and the Indo-Chinese countries and islands, and are generally met with in small flocks searching the leaves for insects.

Family V. PYCNONOTIDÆ. BULBULS.

The members of this numerous and fairly well-defined family of [Case 73.] somewhat Thrush-like birds are peculiar to the Old World and found throughout the Ethiopian, Indian, and Malayan regions. They are generally characterised by well-developed bristles round the gape, a short metatarsus, and a rounded concave wing. They are birds of feeble flight and arboreal habits, and frequent gardens, low jungles and forests, feeding chiefly on berries and fruits. Many of the species are gregarious. The nest is generally an open structure of sticks, grass, and moss, placed in a low tree or creeper, and the eggs are almost invariably marked and spotted. Many of the species, especially those of the genera *Otocompsa* (1958, 1959) and *Pycnonotus* (1960-1963), have a sweet song and are favourite cage-birds.

The usual coloration is olive or brown, but brilliant exceptions are to be seen in the Fairy Blue-bird (*Irena puella*) (1980), the beautiful green species of *Chloropsis* (1981-1984), and the red-throated, orange-breasted *Rubigula dispar* (1956) from Java.

Family VI. TIMELIIDÆ. BABBLERS.

The characters and limits of this large Old-World family, which [Case 72.] includes a somewhat varied assemblage of species, is still imperfectly understood. They may be generally characterised as Thrush-like birds with well-developed bristles at the gape, short, rounded, concave wings, fitting closely to the body, and strong metatarsi. The majority are decidedly terrestrial in their habits, creeping about singly or in small companies among thick undergrowth; but some, such as the Chinese "Robin" (*Liothrix lutea*) (1940) and its allies, as well as the thick-billed *Paradoxornis* (1941) and the smaller, more Tit-like *Suthora* (1942), are more arboreal and should probably be associated with the *Paridæ*. Six subfamilies are recognised, but we can only briefly note some of the more remarkable forms. In the *Crateropodinae* we find the curious spinous-tailed species (*Orthonyx spinicauda*) (1892), the handsome *Cinclosoma punctatum* (1893), and the "Coach-whip" bird (*Psophodes*) (1899), which has a note like the crack of a whip, all three being natives of Australia; the curious *Eupetes* (1894), with somewhat the appearance of a long-legged Woodpecker, the Scimitar-Babbler (*Xiphorhamphus supercilialis*) (1912), remarkable for its very long, slender, curved bill, and the Laughing Thrush (*Dryonastes chinensis*) (1907),

a favourite cage-bird. To the *Timeliinæ* belong such remarkable forms as the Fluffy-backed Babbler (*Ptilocichla falcata*) (1933) and the Hairy-backed Babbler (*Macronus ptilosus*) (1926), in which the feathers of the back are enormously developed; also the large yellow species of *Malia* (1936) from Celebes. The third subfamily, *Brachypteryginæ*, includes some long-legged terrestrial forms, the largest and handsomest of which are the Whistling-Thrushes (*Myiophoneus*) (1950) and the smallest the Short-wings (*Oligura*) (1945). Among the representatives of the fourth subfamily, *Sibiinæ*, we may draw attention to the Long-tailed Sibia (*Sibia picaoides*) (1951) and *Yuhina nigrimentum* (1952), exhibited with its well-concealed nest. To the *Liothrichinæ* belong the beautiful Chinese "Robin" (*Liothrix lutea*) (1940) mentioned above, a familiar cage-bird with Tit-like habits, and the handsome *Cutia nipalensis* (1939), from Nepal. The so-called Crow-Tits (*Paradoxornithinæ*) form the sixth subfamily, a very isolated group, and may be recognised by their short deep bill, most developed in the species of *Paradoxornis* (1941) and less so in *Suthora* (1942).

Family VII. TROGLODYTIDÆ. WRENS.

[Case 73.] This family embraces a number of small birds which are spread over the greater part of the globe, being very abundant in the New World but absent in the Australian and Ethiopian regions. They have no bristles at the base of the bill, build domed nests, and in many cases have remarkable powers of song. The best known is the Common Wren (*Anorthura troglodytes*) (2001), a familiar British bird, ranging across Europe as far east as Persia and southwards to the Atlas Mountains in N. Africa. One of the largest is the Great Bay Wren (*Cinnicerthia unirufa*) (1989), a native of Colombia and Ecuador.

Family VIII. CINCLIDÆ. DIPPERS.

[Case 73.] The Dippers or Water-Ouzels are large aquatic Wrens inhabiting the mountain-streams of the northern parts of both Hemispheres as well as the highlands of Central America and the Andes of South America. They are perfectly at home in the water, diving with ease, and using both wings and legs to propel themselves below the surface. Aquatic insects and molluscs found among the stones at the bottom of streams and rivers form their principal food, and though they are generally supposed to devour the ova of fish, and for this reason constantly destroyed as vermin, no fish-spawn has ever been found in their stomachs. The domed nest (2012), made of moss &c., is placed close to the water, and from four to seven dull white eggs are laid. The young are able to swim as soon as they leave the nest. Of the twelve or more species, all

included in the genus *Cinclus*, the most familiar is the Common Dipper (*C. aquaticus*) (2007), which frequents the more rapid rocky streams in the British Islands and ranges eastwards over Central and Western Europe.

Family IX. MIMIDÆ. MOCKING-BIRDS.

The Mocking-birds are an American family allied to the Thrushes [Case 73.] and ranging over the greater part of the New World. The young are mottled, as in the *Turdidæ*. Some, like the Common Mocking-bird (*Mimus polyglottus*) (2014) of the eastern United States, are famous not only for their powers of mimicry, but for the brilliant execution of their natural song, which is rich and varied. Another well-known songster is the Cat-Bird (*Galeoscoptes carolinensis*) (2017), which, in addition to its attractive song, utters mewing sounds. Leconte's Thrasher (*Harporhynchus lecontei*) (2026) haunts more arid situations than the species already mentioned, but, like them, places its large nest of sticks, &c., in some low tree or thorny bush. The only brightly coloured member of the family is the Rose-breasted *Rhodinocichla rosea* (2022), found in Colombia and Venezuela.

Family X. TURDIDÆ. THRUSHES.

The Thrushes, Redstarts, and Chats form a very large family distributed over the whole world and include a number of familiar species, many of them being splendid songsters and favourite cage-birds. [Case 74.] Unlike their allies, the Warblers, they have no spring moult, and the young in their first plumage differ from the adult and are always profusely spotted. Many species are migratory. Some of the Thrushes are met with at great elevations, reaching altitudes of 17,000 feet in some latitudes. They feed chiefly on insects and worms, most of their food being procured on the ground, but they are also partial to fruit. Of the nine subfamilies recognised, the first, *Myidestinæ*, includes a number of American forms of somewhat uncertain affinities. The beautiful species of *Cochoa* (2034), from the Indo-Chinese countries, represent the second subfamily. Of the *Turdinæ* or True Thrushes, a number appear on the British List, the Song-Thrush (2060), Mistle-Thrush (2053), Blackbird (2036), and Ring-Ouzel (2056) being breeding-species; the Red-wing (2062) and Fieldfare (2054) regular visitors; and the Siberian (2065), Black-throated (2055), Dusky (2055 a), White's (2045), and Rock- (2063) Thrushes, accidental stragglers. Our common Hedge-Sparrow (*Accentor modularis*) (2066) is a resident and the Alpine Accentor (*A. collaris*) (2067) an occasional visitor to Britain, and

represent the fourth subfamily; while the few Australian species of *Ephthianura* (2088-2070) constitute the fifth.

The *Henicurinæ* includes the fork-tailed species of *Henicurus* (2071) and *Hydrocichla* (2072), inhabiting the mountain-streams of the Indian Region, and resembling Pied Wagtails in general appearance and habits.

To the *Ruticillinæ* belong our Common (2074) and Black (2075) Redstarts, Robin (2082), Nightingale (2080), and Northern or "Sprosser" Nightingale (2080 a), which has been recently procured in Kent, as well as the Blue-throat (2079), an irregular visitor to our coasts; also the Ruby-throats (*Calliope*) (2083), Chat-Thrushes (*Cossypha*) (2094-5), and Shammas (*Cittocincla*) (2092), the latter much prized as cage-birds on account of their sweet song.

The Chats (*Saxicolinæ*) form the eighth subfamily. The British breeding-species belonging to this group are the Stonechat (2099), Whinchat (2100), and Common Wheatear (2107), while the Eastern Stonechat (2099 a), Isabelline (2106), Black-throated (*Saxicola occidentalis*) (2114), Black-eared (*S. stapazina*) (2114 a), Western Black-eared (*S. catarinæ*) (2114 b), and Desert Wheatears (2115) have occurred as stragglers.

The ninth and last subfamily (*Sialinæ*) contains some strikingly handsome forms, such as the American *Sialia sialis* (2113) and *Grandala cœlicolor* (2111), found on the highest parts of the Himalaya at elevations of from 15,000 to 17,000 feet.

Family XI. SYLVIIDÆ. WARBLERS.

[Case 75.]

The numerous representatives of this family are distributed over the Old World and include some of our finest songsters, such as the Blackcap. They are distinguished from the Thrushes by having a double moult, one in spring and one in autumn, and their young in first plumage resemble the adult, but are rather more highly coloured. With few exceptions they are birds of plain plumage. The majority are migratory and traverse immense distances, but some, such as the Grass-Warblers (*Prinia* and *Cisticola*), are quite sedentary and incapable of protracted flight. The food consists of insects, but most of the species at certain times of the year feed on fruits, &c. No less than twenty-five species are included in the British List, twelve of which are regular summer-visitors, while the remainder are accidental. To the former category belong the Grasshopper- (2118), Sedge- (2123), Marsh- (2119), and Reed- (2121) Warblers, the Wood-Wren (2144), Willow-Warbler (2145), Chiffchaff (2143), Dartford Warbler (2134), Garden-Warbler (2140), Blackcap (2137), Whitethroat (2139), and Lesser Whitethroat (2138). The latter include Pallas' Grasshopper-Warbler

(2118 a), the Rufous (2117), Aquatic (2122), Great Reed- (shewn with its nest at the foot of the Case) (2141), Melodious (2133), Icterine (2132), and Radde's Warblers (2142), the Northern (2145 a), Greenish (2152), Pallas' (2153), and the Yellow-browed (2154) Willow-Warblers, the Northern Chiffchaff (2143 a), the Sub-alpine (2155), Barred (2156), Orphean (2157), Sardinian (2157 a), and Cetti's (2157 b) Warblers; while Savi's Warbler (2158), to be seen with its nest at the foot of the Case, formerly bred in the Eastern counties of England, but has disappeared since the draining of the fens. The Tailor-birds (*Sutoria*) (2124) are specially interesting on account of the skill they display in the construction of their nests. By sewing the edges of one or more leaves together they form a pocket in which they build a nest of fine grass, cotton, down, and hair.

Far the most brilliant forms are found among the beautiful little species of the genus *Malurus* (2159-63), chiefly found in Australia; and the Emu-Wren (*Stipiturus malachurus*) (2167) from the same country is worthy of note, on account of its long spiny tail-feathers with curious decomposed webs.

Family XII. VIREONIDÆ. GREENLETS.

This small family, including about sixty arboreal species, mostly [Case 75.] olive or greenish in colour, is peculiar to the New World. Though evidently allied to the Shrikes, which they resemble in the notched bill beset with bristles, the young in first plumage do not differ much from the adults and are never barred, and in this and other respects they resemble the Warblers. The species of *Vireo* (2174-7) suspend their firm cup-shaped nest from a horizontal fork and lay white eggs, spotted with red and purple.

Family XIII. AMPELIDÆ. CHATTERERS.

The Chatterers form a somewhat ill-defined family, belonging to the [Case 75.] group of Passeres, which possesses only nine primary quills. They are chiefly northern in their habitat, but certain tropical genera are found in North and Central America. The best known of the Chatterers is the Waxwing (*Ampelis garrulus*) (2179), which is found in the northern parts of both hemispheres and occasionally visits Britain in some numbers. Its name is derived from the sealing-wax-like tips of the secondary quills. The movements of this species are very irregular and uncertain; on the approach of winter it appears here and there in immense flocks in quest of seeds and berries. The nest is made of twigs and moss lined with feathers, and the eggs are stone-grey, spotted with blackish-brown. Another well-known species is the American Cedar-bird (*A. cedrorum*) (2180).

Family XIV. ARTAMIDÆ. SWALLOW-SHRIKES.

- [Case 75.] The Wood-Swallows, as they are sometimes called, constitute a small group of birds characterised by their pointed greyish-blue bill and long pointed wings. In their actions and mode of life they closely resemble the Swallows. With the exception of one West African species, all are found in the Indian and Australian regions and belong to the genus *Artamus* (2183-7). The common Australian species (*A. sordidus*) has a curious habit of hanging in great clusters, like a swarm of bees, from the underside of a branch.

Family XV. VANGIDÆ. MADAGASCAR SHRIKES.

- [Case 76.] This small family of Shrikes includes six genera and twelve species, all peculiar to Madagascar. Representative forms of *Vanga* (2188) and *Leptopterus* (2189) are shewn.

Family XVI. PRIONOPIDÆ. WOOD-SHRIKES.

- [Case 76.] The Wood-Shrikes comprise a large number of species ranging from Africa and Southern Asia to New Guinea, the Polynesian Islands, and Australia. Most of the species are dull-coloured birds, the predominating colours being brown, grey, and black. They frequent trees and bushes, feeding on insects, mollusca, and fruits. Among these many forms we may call attention to the so-called Magpie-Lark (*Grallina picata*) (2190), a familiar bird about many Australian homesteads; Rüppell's Wood-Shrike (*Eurocephalus rueppelli*) (2193), exhibited with its nest, and the helmeted species of *Prionops* (2202), both from Africa; the Jay-Shrike (*Platylophus ardesiacus*) (2201), with its remarkable long crest, from the Malay Peninsula; and the peculiar *Hypocolius ampelinus* (2205) from South-west Asia. The systematic position of the latter bird (a pair of which are exhibited with their nest) has given rise to much discussion among ornithologists, some placing it in one family and some in another. Probably it should be associated with the Chatterers, which it resembles not only in its structure but in its habits. Its eggs are white with greyish-black spots.

Family XVII. LANIIDÆ. SHRIKES OR BUTCHER-BIRDS.

- [Case 76.] The Shrikes are a nearly cosmopolitan family of birds, being found everywhere except in South America. The typical forms are characterised by their strongly hooked notched bill, which somewhat resembles that of a Falcon. The young in their first plumage differ from the adult and have the plumage barred. The smaller and weaker members of the group are insectivorous, but the larger forms prey on small mammals, birds, and reptiles.

Of the four subfamilies recognised the *Gymnorhinæ* include some of the large forms such as the Piping Crows (*Gymnorhina* and *Cracticus*) (2206-8), of Australia, and the remarkable red and black *Pityriasis gymnocephala* (2209), from Borneo. The true Shrikes or Butcher-Birds (*Laniinæ*) derive their name from their habit of impaling their prey upon the thorns which surround their nest, and mice, birds, frogs, and insects are to be found hanging in the "larders" of these birds. The most familiar is the Red-backed Shrike (*Lanius collurio*) (2218), a summer visitor, breeding in England and the South of Scotland. The Great Grey (2214), the Lesser Grey (2215), and the Woodchat (2219) Shrikes are occasional visitors to Britain, and there is evidence that the last species has bred on more than one occasion in the south. The Masked Shrike (*L. nubicus*) (2217) is said to have been procured in Kent once.

Among the African subfamily *Malaconotinæ* we find some most brilliantly coloured forms, such as the species of *Laniarius* (2223-30).

The *Pachycephalinæ* are a large group of smaller forms ranging from Australia and Polynesia to Borneo and the Philippines. One of the largest and most handsomely marked species is the Australian *Falcunculus frontalis* (2243), a pair of which are exhibited with their nest.

Family XVIII. PARIDÆ. TITS OR TITMICE.

The numerous small birds comprising this family are spread over all the northern parts of the Old and New World, and extend their range southwards throughout Africa, but are not met with in South America or in the Australian region. As a general rule the species are not migratory. They are characterised by their stout conical bill. As in the Crows the metatarsus is strongly scaled. The plumage is alike in both sexes, and there is only one moult, which takes place in autumn. Except during the breeding-season they congregate in flocks, and, in company with Golden-Crested Wrens, Tree-Creepers, Nuthatches and other small birds, traverse the woods in search of insect-food. The majority place their somewhat roughly made open nest in holes in trees or walls, but the Long-tailed Tits (*Ægithalus*) (2244-6) build a beautiful domed nest of moss and lichen, thickly lined with feathers, with an opening near the top, while the species of *Remiza* (2247-8) construct a purse-shaped nest of felted down with a tubular entrance. Six species are found in Great Britain, viz: the Great (2253), Coal- (2260), Marsh- (2266), Blue (2251), Crested (2263), and Long-tailed Tits (2244), the latter being one of our smallest birds. The Northern Marsh-Tit (2266 a) is an accidental visitor. Of the exotic species, one of the most striking is the Sultan-Titmice (*Melanochlora sultanea*) (2262) from the Indo-Chinese countries, conspicuous on account of its long yellow crest. [Case 77.]

Family XIX. PANURIDÆ. BEARDED TITS.

- [Case 77.] The sole representative of this family is the Bearded Tit or Bearded Reedling (*Panurus biarmicus*) (2249), which is still found as a resident in the Norfolk Broads and ranges across Europe to Central Asia. It was formerly more widely distributed over the southern counties of England, but the draining of the reedy-fens destroyed its breeding-grounds. Its affinities are somewhat doubtful, but its natural position appears to be near the Tits. The male is more handsomely marked than the female, which lacks the grey head and black moustache. The food consists of insects and mollusca, for which it searches among the reed-beds. The nest, made of dead flags, grass, &c. and lined with reed-flowers, is built among aquatic plants near the water. The eggs are white, streaked with wavy lines of brownish-black.

Family XX. CHAMÆIDÆ. WREN-TITS.

- [Case 77.] Three American species of *Chamæa* (2268), peculiar to the dried plains and bushy hill-sides of Oregon and California, are the representatives of this family. In their habits and general appearance they resemble the Wrens.

Family XXI. REGULIDÆ. GOLDEN-CRESTED WRENS.

- [Case 77.] About a dozen species of tiny birds inhabiting the northern parts of the Old and New Worlds comprise this family, which is intermediate between the Titmice and Warblers. The Common Gold-crest (*Regulus cristatus*) (2269), a resident British species and the smallest of our native birds, ranges across Europe and Northern Asia. Its cup-shaped nest of moss and feathers is suspended below the end of a branch and may contain as many as twelve tiny white eggs suffused with yellowish-brown. The Fire-crest (*R. ignicapillus*) (2270) is an irregular visitor to our shores. A very handsome species is the North American Ruby-crest (*R. calendula*) (2272), which differs from the other species in having a red crest.

Family XXII. SITTIDÆ. NUTHATCHES.

- [Case 77.] The Nuthatches, of which our common species *Sitta cæsia* (2274) is typical, are closely allied to the Titmice, but may be distinguished by their strong, elongate, wedge-shaped bill. They have the general appearance of small Woodpeckers and climb trees with almost the same facility, but unlike these birds they have a short, square tail composed of soft-plumaged feathers. The well-timbered districts and forests of

North America, Europe, and Asia are their home, and eastwards, allied forms (*Neositta*) (2279-81) occur in New Guinea and Australia, while one genus (*Hypositta*) is found in Madagascar. Like its allies, the Common Nuthatch is a resident species, and ranges from Central and Southern Europe to North-West Africa. As its name implies, it is extremely partial to hazel-nuts, with which it varies its insect diet. The nut is firmly wedged by the bird in some chink of bark and the shell is then broken by repeated blows from the strong bill. The nesting-site is almost always a hole in a tree, and should the entrance be too large, it is neatly plastered up with clay and reduced to the required size. The extraordinary nest (2282) exhibited in the Case was placed in the side of a haystack and measured thirteen inches in length, the weight of clay being eleven pounds. The Australian *Neositta* makes a small funnel-shaped nest placed in a forked branch of a tree (2281).

Family XXIII. CERTHIDÆ. TREE-CREEPERS.

The typical Tree-Creepers (*Certhia*) (2348-50) are distinguished from [Case 77.] other Acromyodian Passeres by having long *stiff-pointed* tail-feathers, like those of a Woodpecker, but all the other members comprising this family, though they climb with equal facility, have a soft, nearly square tail. The bill is long and curved, well adapted for extracting insect-food from crevices in the bark of trees or in rocks. The family ranges from North and Central America, Europe, and Asia, eastwards to New Guinea and Australia, and the majority of the species inhabit wooded districts. The Common Tree-Creeper (*Certhia familiaris*) (2348), a well-known British resident, places its nest in holes and crevices in trees and walls and lays white eggs spotted with red and lilac. The beautiful Wall-Creeper (*Tichodroma muraria*) (2353), which inhabits the mountains of Southern Europe and Asia, nesting in some crevice of the rocks, has on two occasions visited England.

Family XXIV. ZOSTEROPIDÆ. WHITE-EYES.

The numerous small species of *Zosterops* (2283-7) derive their name [Case 77.] "White-eye" from the ring of white feathers which encircles the eye in all. The sexes are alike in plumage and the predominating colours are olive-green and yellow. The various species range from Africa and Southern Asia to Japan, and through the Malay region and Polynesia to Australia and New Zealand. Their habits and notes are Tit-like and they generally feed in small flocks, searching the trees and bushes for insects.

Family XXV. DICAÏDÆ. FLOWER-PECKERS.

[Case 77.] These small birds are allied to the Sun-birds, but are distinguished by having a much shorter bill which is serrated along the edges of both mandibles.

They range from India and the Indo-Malayan countries, through New Guinea to Australia, and a few representatives are found on the West Coast of Africa. The plumage is generally brilliant in the males, plainer in the females. In their habits and choice of food they resemble the Sun-birds. The species of *Dicaeum* build beautiful purse-shaped nests suspended from a slender branch. They are either made entirely from the cotton-like substance which fills the seed-vessels of many plants (2288), or have an outer coating of moss and lichen (2289-90). The more Tit-like Australian species of *Pardalotus* (2292), which have a stouter bill, breed in holes in trees, walls, or banks, and construct a round nest of roots, grass and feathers.

Family XXVI. NECTARINIIDÆ. SUN-BIRDS.

[Case 77.] In their brilliant metallic plumage and outward appearance the Sun-birds bear a strong superficial resemblance to the *Trochilidæ*, and are often mistaken for them. A notable case is that of *Cinnyris osea* (2305), a species inhabiting Palestine, and known to the English residents as the "Jericho Humming-Bird." The numerous species are confined to the Old World and range from Africa and Southern Asia to New Guinea and Australia. The bill is long, curved and slender, finely serrated at the extremity; the tongue, extensile and tubular like that of the Woodpeckers and Humming-Birds; and the sexes are generally very different from one another in coloration, except in *Arachnothera* (2307). Sun-birds resemble the Tits and White-eyes in their habits, generally hunting for insects among the trees and bushes in pairs or small bands. With their long tongue they extract the nectar from flowers while clinging to the stems, for they are unable to poise themselves in the air after the manner of Humming-Birds. The elaborate nest is either hung from the end of a branch, as in the case of *Æthopyga magnifica* (2309), or attached to the underside of a leaf, as in *Eudrepanis pulcherrima* (2310). The eggs are two in number and invariably spotted.

The nest of the Spider-hunter (*Arachnothera robusta*) (2307) sewn to the under side of a broad leaf, displays a different type of structure.

Family XXVII. DREPANIDIDÆ. HAWAIIAN HONEY-SUCKERS.

[Case 77.] This small but interesting family includes a number of curious forms peculiar to the hill forests of the Sandwich Islands. Some, such as the

Long-billed Hemignathus (*Hemignathus procerus*) (2341), resemble the Sun-birds, but the bill is not serrated, others have the bill stout and Finch-like, while in one remarkable form, *Pseudonestor* (2346), it is Parrot-like. The splendid feather-cloaks, waist-bands, and mask-decorations of the former Hawaiian Kings were chiefly composed of the yellow plumage of the "Mamo" (*Drepanis pacifica*) (2347) and the scarlet feathers of the "Jiwi" (*Vestiaria coccinea*) (2342). The former bird, a drawing of which is exhibited in the Case, is now almost extinct.

Family XXVIII. MELIPHAGIDÆ. HONEY-SUCKERS.

The Honey-suckers are one of the most characteristic families of [Case 78.] birds met with in Australia, and range to New Guinea, the Moluccas, and Polynesia. They are chiefly remarkable in possessing an extensile tongue, forked at the tip and broken up into numerous horny fibres, so as to form a brush specially adapted for gathering honey and small insects from the cups of flowers. Two subfamilies are recognised: the *Myzomelinæ*, including the smaller species such as *Myzomela* (2315-7), with the general appearance of Sun-birds; and the *Meliphaginæ*. The latter contain all the remaining forms, some being larger birds of the size of a Thrush. In many species parts of the head are bare, and wattles on the sides of the head and throat are often developed. Among the species exhibited we may call attention to the following:—*Ptilotis gracilis* (2325), the representative of a large and widely distributed genus, characterised by the ornamental yellow ear-tufts. Its neatly woven cup-shaped nest is suspended from a forked branch. The remarkable Tui of New Zealand (*Prothemadera novæ zealandiæ*) (2330), commonly known to the colonists as the "Parson-bird" on account of the peculiar white feathers which adorn its throat and their fancied resemblance to the clerical bands. It is a favourite cage-bird on account of its sweet notes and powers of mimicry. The Large Wattled Honey-eater (*Acanthochæra carunculata*) (2339), a native of Australia, is exhibited with its nest and eggs. The Friar-Bird (*Philemon corniculatus*) (2329), also from Australia, has a bare head and curious horn at the base of the bill. It will be noted in the skeleton of this species that the horn is supported by a bony core. Lastly, Turati's Honey-eater (*Melidectes emilii*) (2321), a curious form with large wattles on the throat, is peculiar to New Guinea.

Family XXIX. MNIOTILTIDÆ. AMERICAN WARBLERS.

These birds are entirely confined to the American region and may be [Case 78.] regarded as representing the *Sylviidæ* of the Old World. Generally speaking they resemble the Warblers in their mode of life, but some, such as *Mniotilta varia* (2359), are more like Creepers and run up trees

with almost the same facility. They differ from our Warblers in having only nine primary quills and in being more brightly coloured. About a hundred and fifty species have been distinguished, but it is doubtful whether some of the genera included in this family should not be placed elsewhere, the "American Redstarts" (*Setophaga*) (2366-7) being referred by certain authors to the Flycatchers, which they resemble in appearance and habits, while others appear to have more affinity to the Wrens, Greenlets, and Tanagers respectively. The most numerous represented genus *Dendroica* (2354-8) includes nearly forty species, of which the Golden Warbler (*D. aestiva*) (2354) is one of the most familiar North American birds. A specimen obtained in Durham in May 1904 was supposed to have been an accidental straggler. The cup-shaped nest of this bird and other allied forms is placed in trees and bushes, and the eggs are spotted with reddish brown, lilac, and grey.

Family XXX. MOTACILLIDÆ. WAGTAILS AND PIPITS.

[Case 78.] The nine-quilled Passeres included in this family range over the greater part of the World, but are absent in Polynesia. As in the Larks, the inner secondary quills are greatly lengthened and as long as the primaries. With the exception of two species which occur in North-west America, the Wagtails (*Motacilla*) (2368-74) are entirely confined to the Old World. They are almost entirely terrestrial in their habits and frequent the vicinity of water, both fresh and salt, meadows, and damp ground. With quick running movements and constantly vibrating tail, they catch flies and other insects, occasionally capturing them on the wing. Of all birds Wagtails are the most graceful both in their form and movements. Five species visit and breed in the British Islands, viz.: the Pied (2369), White (2370), Grey (2371), Yellow or Ray's (2372), and Blue-headed (2373) Wagtails. Of these, the first-named is by far the commonest, while the last, although it has been known to breed, can only be regarded as an irregular visitor on migration. The Grey-headed (*M. viridis*) (2373 a) and the Black-headed (*M. melanocephala*) (2373 b) have also been recorded, the former as breeding. The Pipits (*Anthus*) are generally to be distinguished by their sombre brown coloring, the most notable exception being the East African *Tmetothylacus tenellus* (2383), which has most of the plumage yellow. In external appearance and habits they are very similar to Larks, and the males soar in the air while they sing. On the British List we find the Tree- (2375), Meadow- (2376), and Rock- (2377) Pipits, which are common and breed; the Norwegian form of the Rock-Pipit (*A. rupestris*) (2378), which only occurs on migration; and the Red-throated (2379), Tawny (2380), Richard's (2381), and Water- (2382) Pipits, all accidental stragglers to our shores. The African genus *Macronyx* (2385-7) includes several

species with brightly coloured under parts bearing a strange superficial resemblance to certain American species of "Meadow-Lark" (*Sturnella*) belonging to the family *Icteridæ* (p. 132). The Common Cuckoo frequently places her egg in the nests of Wagtails and Pipits, the Titlark or Meadow-Pipit (*A. pratensis*) (2376) being a favourite host.

Family XXXI. ALAUDIDÆ. LARKS.

Of the hundred or more species recognised, the majority are inhabitants of the Old World, but the Horned or Shore-Larks (*Otocorys*) (2394-6) are also found in America, where they range as far south as Colombia in South America. Larks are almost entirely terrestrial in their habits and generally frequent open grassy plains or desert districts, but the species of *Mirafra* (2392) and *Lullula* prefer the vicinity of bushes or copses, and frequently perch, while *Otocorys*, except during the winter months, dwells on the high uplands. The habit of soaring while uttering their song is common to the group, and with the exception of a few species of *Mirafra*, all nest on the ground. The eggs are generally white, closely spotted with brown and grey. As in the Wagtails and Pipits the inner secondary quills are greatly developed and equal in length to the primaries, but the Larks are distinguished from these and other Passerine birds by having the hinder aspect of the metatarsus scutellated or covered with scales. The Sky-Lark (*Alauda arvensis*) (2389), and the Wood-Lark (*Lullula arborea*) (2390) are the only resident species in the British Islands, but the European Horned Lark (*Otocorys alpestris*) (2394) is a more or less regular winter visitor, and the Crested (2388), Short-toed (2399), White-winged (2400), and Black (2400 a) Larks are occasional stragglers to our shores. The Finch-Larks (*Pyrrhulauda*) (2397-8) have short thick bills, and form a rather distinct genus with the sexes differing in colour. [Case 78.]

Family XXXII. FRINGILLIDÆ. FINCHES and BUNTINGS.

The Finches form one of the largest families of Song-birds and number about six hundred species, which are nearly universally distributed. As may be inferred from the structure of their short, stout, conical bill, they live principally on seeds. In many species the summer-dress is gained not by moult, but by the shedding of the edges of the winter plumage, so that the underlying pattern comes into prominence. The change thus effected is specially marked in the male of the Snow-Bunting (*Plectrophenax nivalis*) (2473), the rufescent winter dress becoming entirely black and white in summer. Three subfamilies are recognised: the Grosbeaks (*Coccothraustinæ*), the true Finches (*Fringillinæ*), and the Buntings (*Emberizinae*), characterised in the typical forms [Cases 79, 80.]

by marked differences in the shape of the bill. To the former belong the Hawfinch (*Coccothraustes*) (2404) and Greenfinch (*Chloris*) (2412), both well-known British species, as well as a large number of thick-billed forms, such as the brilliantly coloured Crested Cardinals (*Cardinalis*) (2417), chiefly found in America.

Of the *Fringillinae* many are included in the British List. Those that breed are the Chaffinch (2419), Goldfinch (2422), Siskin (2426), Linnet (2433), Lesser Redpoll (2434), Twite (2431), House-Sparrow (2439), Tree-Sparrow (2438), Crossbill (2454), and Bullfinch (2461); the Brambling (2420) and Mealy Redpoll (2432) are winter-visitors; while the Serin Finch (2457), Citril (2457 a), Snow-Finch (2457 b), Parrot Crossbill (2453), Two-banded Crossbill (2459), Rose-Finch (2458), and Pine-Grosbeak (2509) are accidental visitors. The Crossbill is an instance of peculiar modification, the mandibles crossing each other in front, and enabling the bird not only to open fir-cones, on the seeds of which it principally feeds, but to use its bill for climbing like a Parrot. Other notable forms are the Saffron-Finches (*Sycalis*) (2447) of South America, frequently kept as cage-birds, but generally too pugnacious to live with other species; the handsome *Rhynchostruthus socotranus* (2434 a), peculiar to the island of Sokotra; and the brilliant scarlet Sepoy-Finch (*Carpodacus sipahi*) (2449) from the Himalaya.

The Buntings (*Emberizinae*) are also well represented in the British List, the breeding-species being the Common or Corn- (2467), Yellow (2471), Cirl (2470), Reed- (2463), and Snow- (2473) Buntings, while the Black-headed (2462), Ortolan (2465), Yellow-breasted (2466), Siberian Meadow- (2475), Meadow- (2475 a), Rustic (2476), Little (2477), Large-billed Reed- (2463 a), and Lapland (2474) Buntings are accidental visitors. A large number of American genera are also included in this group; some, such as *Cyanospiza* (2482-4) and *Paroaria* (2506), containing brightly coloured species.

Family XXXIII. CÆREBIDÆ. AMERICAN CREEPERS.

[Case 80.] The American Creepers or Quit-Quits are a nine-primaried family, allied to the Tanagers, but in their habits and other points they resemble the Tits (*Paridae*) and Creepers (*Certhiidae*) of the Old World. The bill is usually slender, sometimes conical or strongly hooked at the tip as in *Diglossa* (2516-9), and the extensile tongue is forked and fringed at the extremity. They belong exclusively to the tropical forest-clad parts of the New World, ranging from Southern Florida to Bolivia and South-east Brazil. Like the Tanagers, their plumage is a combination of the brightest colours, and hence some species, such as the Blue Creeper (*Cyanerpes cyanea*) (2528), have become an article of trade for the ornamentation of women's hats. The Banana-Quit (*Cæreba flaveola*) (2529)

of Jamaica and other allied species build their domed nests in low trees or bushes where wasps have constructed their paper nests. The object of the bird is evidently to secure a position rendered safe from intruders by the presence of these formidable insects, with whom a league of amity is established.

Family XXXIV. TANAGRIDÆ. TANAGERS.

These brilliantly coloured nine-primaried birds of the New World [Case 80.] are closely related to the Finches, but may generally be distinguished by possessing a notch towards the end of the upper mandible. Some are, however, very closely related to the Finches, others to the *Cærebidæ* and *Mniotiltidæ*. About three hundred and fifty species are recognised, many of which are well known on account of their gorgeous plumage, remarkable even among the richly coloured birds of South America. The most striking forms belong to the genera *Chlorochrysa* (2534-5), *Calliste* (2543-53), *Rhamphocælus* (2561), and *Pyranga* (2565-7); some of which are frequently imported as cage-birds into Europe.

Family XXXV. PLOCEIDÆ. WEAVER-FINCHES.

The Weaver-Birds are nearly related to the Finches, but may be [Case 81.] distinguished by possessing ten primary quills. They form a somewhat numerous family of brightly coloured birds, distributed over the African, Indian, and Australian regions. The trivial name is derived from the skill shown by the typical members of the family in weaving their remarkable nests, which are most ingeniously calculated to ensure the safety of their young. Numerous examples of their architecture will be found exhibited in the Case. Many species have two seasonal plumages, a fact which is especially noticeable in the males. In winter they are mostly dull-coloured and striped with brown, but in the breeding-season they are richly coloured, as in the species of *Heterhyphantes* (2636), *Hyphantornis* (2638-40), and *Ploceus* (2641); while some develop long ornamental tail-feathers such as *Vidua* (2584), *Penthetria* (2585), and *Chera* (2586).

Two subfamilies are recognised, the *Viduinæ*, in which the first primary is very small and falcate, and the *Ploceinæ*, with the first primary large and obtuse.

To the first section belong the Viduas or Whydah-birds (*Vidua principalis* (2584) and *Chera progne* (2586)), remarkable for their habit of soaring during the breeding-season. Rising to a considerable height, they hover in the air, with long arched tail and flapping wings, and presently descend with great velocity. With these are associated many well-known and attractive smaller forms frequently kept as cage-birds,

such as the species of *Munia* (2610-4), *Poëphila* (2624-5), and *Estrilda* (2628-31), and the lovely *Erythrura* (2619-20). Of the numerous species that build in colonies the Sociable Weavers (*Phileterus socius*) (2645) of South Africa is perhaps one of the most interesting. By the united workmanship of a large number of birds, an umbrella-shaped structure of sticks and straw is erected among the branches of a tree, and from the underside of this thatched roof each pair suspend their nest woven of dry grass, and rear their young, secure from the attacks of snakes and other enemies.

Of the *Ploceinæ*, the most familiar is the common Indian species, *Ploceus baya* (2641), which suspends its flask-shaped nest with a long tubular entrance from a branch overhanging the water. This species invariably lays white eggs, but some of the African forms of *Hyphantornis* (2638-40) and *Pyromelana* (2588-9) lay eggs of several types, and the same nest may contain white, pale blue, or green eggs, uniform or spotted with red.

Family XXXVI. ICTERIDÆ. HANG-NESTS. (Plate XXI. fig. 2.)

[Cases 81 & 82.] These birds represent the Starlings and Weavers in the New World, and include a large number of species possessing only nine primary quills. Five subfamilies are recognised. The Cassiques (*Cassicinæ*) are forest-birds mostly of large size, one of the largest being the Central American (*Gymnostinops montezumæ*) (2647). The Maize - Birds (*Agelainæ*) are ground-haunting species frequenting the open pastures, prairie-lands, and pampas. They include the Bobolink (*Dolichonyx oryzivorus*) (2654) and the especially interesting Cow-birds (*Molothrus*) (2655) [Pl. XXI. fig. 2], in which the polygamous and parasitic habits of some of the Cuckoos of the Old World are repeated. The Bobolink, one of the finest American songsters, is perhaps only rivalled by the Baltimore Oriole (*Icterus baltimore*) (2670), a well-known representative of the true Hang-nests (*Icterinæ*). This species and many of its allies are of brilliant black-and-yellow plumage, and for this reason are generally known as American "Orioles," but they must not be confounded with the Orioles of the Old World, which they superficially resemble. *Quiscalus major* (2682) may be taken as a type of the next subfamily, *Quiscalinæ*, characterised by the long stout metatarsi suited to a terrestrial life. Lastly, the *Sturnellinæ*, including the Troupials (*Trupialis*) (2668 a) and "Meadow-Larks" (*Sturnella*) (2668), are remarkable on account of their extraordinary mimetic resemblance to the Pipits, more especially of the genus *Macronyx* (p. 128), their lengthened inner secondaries and strong feet adapting them to their purely terrestrial life. Many of the species

breed in colonies, the *Agelæinæ* and *Quiscalinæ* making cup-shaped nests, while the *Icterinæ* and *Cassicinæ* build elaborate structures, which rival those of the Weavers.

Family XXXVII. ORIOLIDÆ. ORIOLES.

The Orioles form a well-marked group of brightly coloured birds, [Case 82.] mostly of a golden yellow contrasting with deep black. They are entirely confined to the Old World, and range from Africa, through Europe and Asia, to Australia. They are arboreal in their habits, and feed on fruits, especially cherries, and insects. The Golden Oriole (*Oriolus galbula*) (2705) is an annual spring migrant to the south of England, and, if unmolested, would breed there regularly. Its cradle-like nest is skilfully suspended in the fork of a branch, and the eggs are white, blotched with reddish-purple. *Oriolus trailli* (2712), with its crimson and black plumage, represents a differently coloured section of the genus, met with in Eastern Asia, and *Sphecothes* (2710-1) is the representative form in Australia and New Guinea.

Family XXXVIII. DICRURIDÆ. DRONGOS.

These Crow-like Flycatchers form one of the best-defined families of [Case 82.] Passeres, and range from Africa, India, and China through the Malayan Archipelago to Australia. In nearly all the species the plumage is black and the tail strongly forked, especially in the species of *Buchanga* (2699), and in some forms, such as *Dissemurus* (2700) and *Bhringa* (2701), the outer tail-feathers are greatly prolonged, ending in a "racket"; while others, such as *Chibia* (2695), have a long hairy crest of barbless plumes. They feed habitually on the wing, darting from some perch on a tree to catch passing insects. The Larger Racket-tailed Drongo (*Dissemurus paradiseus*) (2700) of India has a really fine song, and is perhaps the best singing-bird in the East. The cup-shaped or cradle-like nest (2694 a) is placed in the fork of a tree, and the eggs are whitish marked with various shades of red.

Family XXXIX. EURYCEROTIDÆ. MADAGASCAR STARLINGS.

Euryceros prevosti (2693), a native of Madagascar, is the sole representative of this family, and is remarkable on account of its abnormally deep and stout bill. [Case 82.]

Family XL. EULABETIDÆ. TREE-STARLINGS.

The Starlings included in this family differ from the true Starlings [Case 83.] (*Sturnidæ*) in being strictly arboreal in their habits, in being provided

with bristles at the base of the bill, and in laying spotted eggs. They range from Africa, through India and the Moluccan Islands, to Australia. The most familiar are the Grackles or Talking Mynas (*Eulabes*) (2727-8), many of which are well-known cage-birds, and can be easily taught to repeat words or sounds.

To this group also belong the beautiful Glossy Starlings (*Lamprocolius*) (2747-8) of Africa, the remarkable Yellow-breasted *Cosmopsarus regius* (2741) of Somaliland, and *Calornis* (2736-8) of the Indian and Australian regions.

Family XLI. STURNIDÆ. STARLINGS.

[Case 83.]

This widely-distributed group is peculiar to the Old World. The young in first plumage are streaked, and in this respect Starlings differ from the Crows, but they resemble the latter in their mode of progression, walking, instead of hopping like Finches and most of the other Passeres. The Common Starling (*Sturnus vulgaris*) (2716) is a common resident in the British Islands, its numbers being augmented by an additional host of migrants in the autumn and winter. Like its allies, though principally an insect-feeder, it is extremely partial to fruit, and does great damage in cherry-orchards. Another species which has occurred as a straggler in our islands is the Rose-coloured Pastor (*Pastor roseus*) (2719). *Basileornis* (2723-4) is represented by a fine crested species found in Ceram. A curious aberrant form is the Ox-pecker or Rhinoceros Bird (*Buphaga*) (2751), so-called on account of its habit, shared with other members of the family, of settling on the backs of cattle, camels, &c., to extract the grubs which infest them.

Family XLII. PTILONORHYNCHIDÆ. BOWER-BIRDS.

(Plates XXIII. fig. 2, & XXIV.)

[Central
Table-
case.]

The Bower-Birds, which are undoubtedly closely allied to the Birds of Paradise and Crows, are peculiar to New Guinea and Australia. They have received their name from their peculiar habit of building bowers or runs where the males meet to play or pay their court to the females. The bowers are built long before the birds begin to construct their nest, which is placed in a tree.

The species of *Ptilonorhynchus* (2752), *Chlamydodera* (2753-5), and *Sericulus* (2756) construct arbour-like galleries of uncertain length, ornamented with shells, bright feathers, and other decorative materials. Newton's Bower-Bird (*Prionodura*) (2757) erects an enormous structure of sticks, sometimes eight feet in height and of a complicated architecture, the main structure being supplemented by dwarf hut-like buildings. The Gardener Bower-Birds (*Amblyornis*) (2758) build a

miniature cabin made of different mosses, and surround it with a tiny perfectly-kept meadow of moss, studded with brilliantly coloured flowers, fruits, and insects, which, as they become faded, are constantly replaced.

The drawings on the adjoining pillar represent the widely different gardens and bowers of *Amblyornis subalaris* (2758 a) [Pl. XXIV.], and *A. inornata* (2758) [Pl. XXIII. fig. 2]. The beautiful "Play-house" of the former species is exhibited in a separate case. It was recently procured in the Owen Stanley Range, British New Guinea, and was received in its present perfect condition. The handsome Green Cat-Birds (*Elurædus*) (2759), so far as is known, are the only members of the family which do not construct a bower.

[Table-case in window.]

Family XLIII. PARADISEIDÆ. PARADISE-BIRDS.

The Birds of Paradise are among the most gorgeously attired birds, and are confined to the forests of New Guinea and the neighbouring islands, as well as Australia. Skins of some of the larger kinds were formerly articles of commerce, and are still exported in some numbers for decorative purposes. About a hundred and fifty years ago it was the custom of the natives, in preparing the skins, to tear off the legs, and sometimes even the wings. The constant arrival in Europe of birds without these natural appendages gave rise to the supposition that Paradise-birds were devoid of them. The male bird was supposed to float about in mid-air, spreading out his long flank-feathers, to form a bower, in which the female built her nest! Thus it was that, in 1766, Linnæus actually named the largest form *Paradisea apoda* (10), or the Paradise-bird without legs. A glance at the structure of the bill and feet will show that these beautiful birds are in all respects extremely similar to Crows, which they resemble in their nesting-habits, their chief characteristic being their fantastic ornamental plumes. A very fine series, including representative forms of almost every genus, is exhibited in the Central Case. The number on each species refers to a special printed list, copies of which are mounted in the Case.

[Central Case.]

An interesting preparation of the windpipe of an adult male of the Purple-and-Violet Manucode (*Phonygama purpureo-violacea*) will be found in the Case. It shows the remarkable convolutions of the trachea between the skin and breast-muscles before finally entering the lungs. The call-note of this species is described as being prolonged, bass, and guttural.

Family XLIV. CORVIDÆ. CROWS.

[Cases
83, 84.]

By almost common consent the birds of this family are placed at the head of the Class *Aves*. Pre-eminence must be given to the members of the genus *Corvus*, more especially to the Raven (*C. corax*) (2793) of the Northern Hemisphere, the bird perhaps best known from the most ancient times.

In the Crow we find the most highly-developed type of wing and foot. In the former every quill and wing-covert is perfectly formed; and in the latter all the scales on the metatarsi and toes are more strongly indicated than in any other Passerine bird.

The distribution of the family is nearly universal.

Three subfamilies are recognised: the True Crows (*Corvinæ*), Magpies and Jays (*Garrulinæ*), and the Choughs (*Fregilinæ*).

[Case 84.]

Of the former the best-known examples are the Raven (2793), Carrion-Crow (2796), Hooded Crow (2797), Rook (2792), and Jackdaw (2801), all well-known British residents; also the Nutcracker (*Nucifraga caryocatactes*) (2806), an irregular visitor to England. A remarkable African form is found in *Corvultur* (2794-5), which has a greatly developed upper mandible.

Our Magpie (2810) and Jay (2823) represent the second subfamily (*Garrulinæ*), with which are also associated various striking Oriental forms, such as *Urocissa* (2822), *Dendrocitta* (2819-20), and *Cissa* (2815-16), and the American genera *Xanthura* (2831-2) and *Cyanocorax* (2829-30).

[Case 83.]

The third subfamily, *Fregilinæ*, includes our Common Chough (*Graculus*) (2837) and the Alpine Chough (*Pyrrhocorax*) (2836).

Among the more aberrant forms also included in the family we may draw special attention to the curious looking West African Bald-headed Crow (*Picathartes*) (2840), the New Zealand Kokako or Wattled Crow (*Glaucopsis*) (2839), and the Huia (*Heterolocha acutirostris*) (2838). In this New Zealand bird the two sexes exhibit a different form of bill, that of the male being moderately powerful, while in the female it is slender and sickle-shaped. The pair are said to hunt in company, and live on the grubs which burrow in wood. The male attacks the more decayed portions of the wood, chiselling out the concealed grubs like a Woodpecker, while the female inserts her long bill into holes, into which the hardness of the surrounding wood prevents the male from penetrating. When the male is unable to reach some larva, the female has been observed to come to his aid, and with her longer and more slender beak secure the hidden prey.

APPENDIX ON THE STRUCTURE OF BIRDS.

[The specimens illustrative of this subject are set out chiefly in the recess No. 4 of the Central Hall.]

The Class Birds—Aves—may be briefly characterised as warm-blooded, egg-laying (oviparous), vertebrate animals, covered with feathers and having the fore-limbs modified into wings. Of these characters, the covering of feathers is alone sufficient to distinguish Birds from all other animals.

Feathers [Figs. 1.-3^A.]—The feathers of Birds correspond to the scales of Reptiles. A typical feather consists of a long tapering shaft or stem (*rhachis*) (fig. 3 1), bearing on each side for the greater part of its length a broad elastic web or vane (2). The part of the shaft to which the vanes are attached is four-sided, solid, grooved along its under surface, and very pliant. Below the vane, the stem is hollow and transparent, and is known as the “quill” or *calamus* (3). The vane is made up of a number of flattened plates known as barbs or *rami* (fig. 3^A 1) set obliquely on the shaft and held together by a very complex arrangement of interlocking processes called barbules or radii (fig. 3^A 2). Where these barbules are perfectly developed and unite the barbs, the vane forms a continuous web, able to withstand the resistance of the air encountered during flight, and more or less impervious to water. In flightless birds the barbules are degenerate, and the barbs of the feathers being no longer held together are said to be discontinuous, as in the Ostrich-tribe, or in the tail-feathers of the Lyre-bird.

In many feathers a small shaft bearing a discontinuous vane is found attached to the base of the under surface of the main shaft where it passes into the quill. This is called the aftershaft (*hyporhachis*) (fig. 3 4). In the Cassowaries and Emus among the Ostrich-tribe, and in the feathers of some nestling birds, this aftershaft equals the main shaft in size.

Five kinds of feathers may be distinguished, viz. :—Contour-feathers, Semiplumes, Down-feathers, Filoplumes, and Powder-down feathers.

Contour-feathers are those which, as their name implies, determine the outline of the body, that is to say, they are all that meet the eye in the living bird. Those covering the head and body are more or less firm in structure and have continuous vanes; those of the wings and

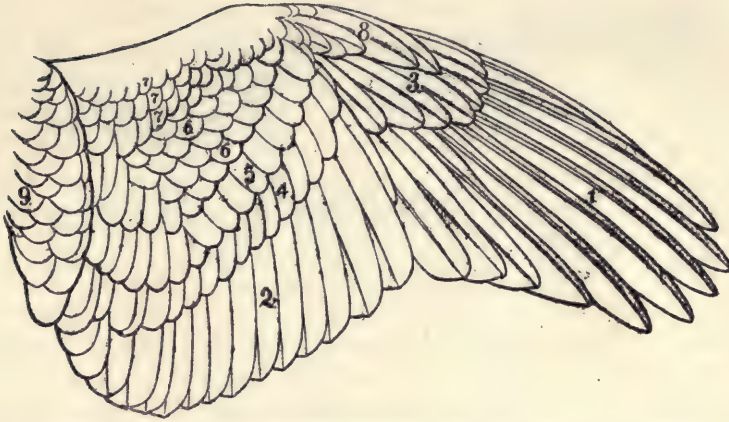
Fig. 1.



Outline figure of the Topography of a Bird. Common Francolin (*Francolinus francolinus*).

- | | |
|-----------------------------------|------------------------------------|
| 1. Forehead. | 13. Tail-feathers (Rectrices). |
| 2. Crown. | 14. Primaries } Remiges or flight- |
| 3. Nape. | 15. Secondaries } feathers. |
| 4. Ear-coverts. | 16. Major wing-coverts. |
| 5. Lores. | 17. Median wing-coverts. |
| 6. Throat. | 18. Minor wing-coverts. |
| 7. Neck. | 19. Under tail-coverts. |
| 8. Interscapular region (mantle). | 20. Abdomen. |
| 9. Scapulars. | 21. Flanks. |
| 10. Back. | 22. Breast. |
| 11. Rump. | 23. Crop. |
| 12. Upper tail-coverts. | 24. Tarso-metatarsus. |

Fig. 2.



Upper surface of Right Wing of a Bird extended to show the relations between the flight-feathers and coverts.

- | | | |
|----------------------------------|------------|-----------------------------|
| 1. Primaries | } Remiges. | 6. Minor coverts. |
| 2. Secondaries | | 7. Marginal coverts. |
| 3. Major coverts of primaries. | | 8. Remiges of bastard wing. |
| 4. Major coverts of secondaries. | | 9. Scapulars. |
| 5. Median coverts. | | |

Fig. 3.



Under surface of Contour-feather showing aftershaft.

- | | |
|------------------------------|---------------------------------------|
| 1. Shaft (<i>Rhachis</i>). | 3. Quill (<i>Calamus</i>). |
| 2. Vane. | 4. Aftershaft (<i>Hyporhachis</i>). |

Fig. 3A.

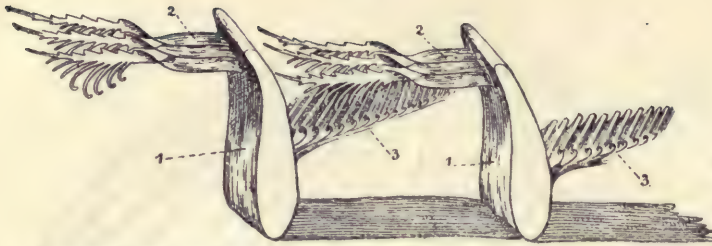


Diagram showing (1) section of barbs (*rami*) and (2, 3) interlocking barbules (*radii*). (After Pycraft.)

tail, in birds which possess full powers of flight, are always well-developed and conspicuously large (p. 139).

Semiplumes are degenerate contour-feathers and have discontinuous vanes. Sometimes they are of great size and beauty and are accordingly much prized for decorative purposes. For instance "Marabou" feathers are the semiplumes of the Marabou and Adjutant-Storks.

Down-feathers are very delicate in structure, the shaft, when present, being very short and weak, whilst the barbs are long and fragile. They are almost always hidden below the contour-feathers, but are occasionally exposed and they form the ruff round the neck of the Condor and certain Vultures. In water-birds these feathers form a thick underclothing recalling the under-fur of Mammals, and often, as in the Swans and Eider-Ducks, have a considerable commercial value. Some birds, such as the Game-birds, Pigeons, and Hornbills, have no down-feathers.

Filo-plumes are long hair-like feathers bearing a minute vane at the tip, and occur in clusters round the base of the contour-feathers. In some birds, for instance in the Cormorants, they appear on the surface of certain parts of the body, notably on the head and neck.

Powder-down feathers occur only in a few groups of birds, either sparsely scattered over the body, as in Parrots and certain Hawks, or in patches on the breast and thighs, as in the Herons. They are remarkable for their extreme friability, constantly breaking up at their tips into a fine powder, which feels smooth and almost greasy to the touch. Nothing is known concerning the development or use of these extraordinary feathers.

The long stiff bristles, which occur round the mouth of certain birds, such as the Nightjars, or form eyelashes in others, for instance in the Ostrich and Ground-Hornbill, and the peculiar tuft which hangs from the breast of the Turkey, are degenerate contour-feathers, which have lost their vanes.

Except in the Penguins, the feathers of a bird are never evenly distributed over the body, but are arranged in long rows or tracts (*pterylæ*) separated by more or less wide spaces (*apteria*). In those birds which have no down the spaces may be seen at once by raising the contour-feathers. The form and arrangement of these tracts and spaces are definite, and characteristic of whole families or orders of birds, and are important for purposes of classification.

The contour-feathers of the head and body overlap one another, and their arrangement resembles that of the scales in a reptile or fish. The large feathers, which fringe the hinder border of the wing and those of the tail, have a peculiar arrangement. The former, called the flight-feathers (*remiges*) (fig. 2 1 & 2), overlap one another laterally, so that their free edges face outwards, towards the front of the extended wing. They are divided into two series, *primaries* and *secondaries*. The primary quills are closely attached to the bones of the hand and vary in number from nine to twelve; while the secondary quills extend from the wrist inwards to the elbow-joint, and vary from six (Humming-birds and Swifts) to thirty-seven (Albatros).

The large quills of the tail (*rectrices*) (fig. 1 13) serve for steering purposes. They rise, like the ribs of a fan, from a common base formed by the last bone of the vertebral column.

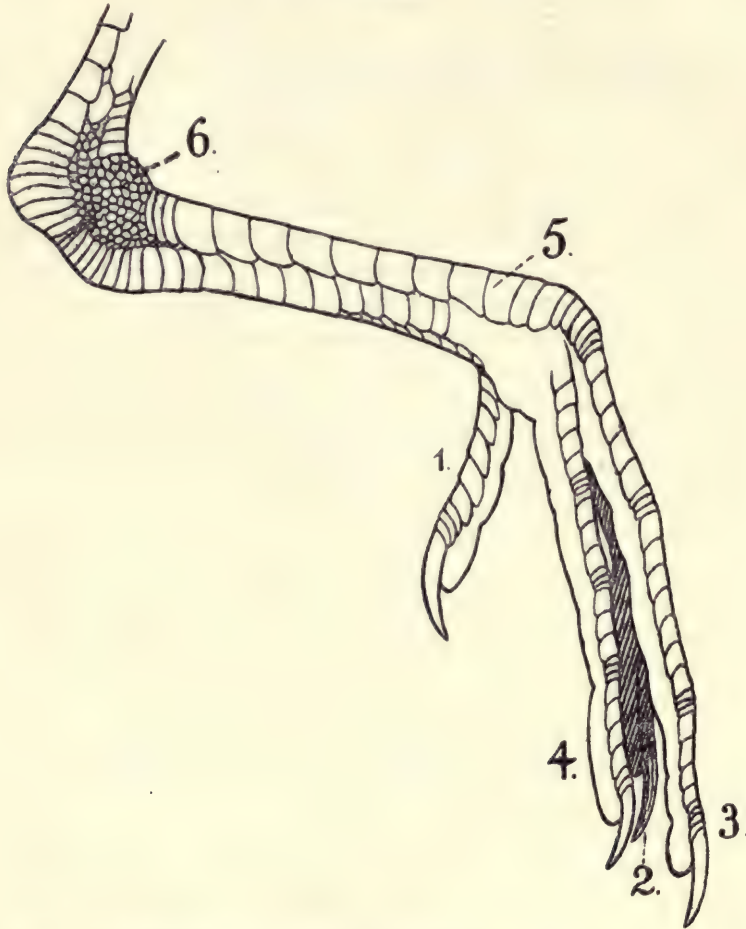
Covering of Beak and Feet [Figs. 4, 8, & 9].—The beak is always, and the feet are usually, devoid of feathers, and encased in a horny covering. The beak is formed by the prolongation of the jaws, which in modern birds never bear teeth, and its sheath (*rhampotheca*) is either formed of a single piece or made up of numerous separate elements, when it is said to be compound. In some birds, such as the Puffins, parts of the beak are periodically shed. The horny covering of the feet (*podotheca*) is generally made up of numerous small pieces which take the form of overlapping plates or scales (fig. 4 5, 6).

Oil-glands.—With few exceptions, birds have a singular apparatus for secreting oil situated on the root of the tail. With the beak they press out a drop of oil from this gland, to lubricate and polish their plumage.

Moult.—The renewal of plumage is a process familiar to all under the term "moult" (*ecdysis*). It occurs at least once a year, and generally twice, in the spring and autumn, when the old worn-out feathers are shed and replaced by new ones. The spring-moult only affects the smaller feathers, but in autumn the change is complete, and generally results in considerable differences of colour constituting the "seasonal plumages" of so many birds, such as the Grebes, Divers, and Weaver-Finches.

Colour.—The colour of feathers is due to one of three causes :—
 (1) It may arise from the presence of actual pigment, (2) from pigment overlaid by colourless structures, or (3) from iridescence due to the effect of light falling on the polished, ridged or pitted surfaces of the feather which act as prisms.

Fig. 4.



Side view of Right Foot of a Purple Gallinule (*Porphyrio*) to show the composition of the horny covering (*podotheca*).

- | | |
|------------------------|--------------------------------|
| 1. Hallux or hind toe. | 4. Outer toe. |
| 2. Inner toe. | 5. Scales (<i>Scutellæ</i>). |
| 3. Middle toe. | 6. Reticulate scales. |

Yellow colour, like black, brown and red, is as a rule due to pigment diffused throughout the substance of the feather. Some yellow feathers, however, contain no pigment whatever, the colour being due to the

reflection of light from various ridges and furrows on the surface of the feather. In other cases the yellow colour, like violet, blue and some browns, is due to pigment in the deeper layers of the feathers combined with peculiar structural modifications of the upper colourless layers.

Turacin is a remarkable crimson pigment found only in the flight-feathers of the Touracos (p. 100).

Blue is never found as a separate pigment in feathers, and green only in the case of the Touracos (p. 100). These colours are formed by the combination of the underlying yellow, orange or brown pigment with the specially modified outer layers of the feather from which the light is refracted.

Metallic colours are those which change according to the relative position of the spectator's eye and the light. Their prismatic properties are partly due to a dark brown pigment and partly to the structure of the barbules of the feather which take the form of a series of overlapping compartments.

White is never due to pigment and is produced by structural peculiarities of the feather.

Heart.—The heart of Birds, as in Mammalia, consists of two completely separated halves, each of which is again divided into an upper chamber, the auricle, and a lower, the ventricle. The blood maintains a high and uniform temperature (from 100° (Gull) to 112° (Swallow)), exceeding that of most mammals by from 8° to 14° . This high temperature permits of no intermission of the energy of the vital functions in cold weather. No Bird, therefore, hibernates as do certain mammals, but such kinds as are unable to obtain their food during the winter-season are obliged to migrate to milder climates.

Lungs.—The lungs are very spongy in texture and are closely attached to the roof of the thoracic region of the body-cavity.

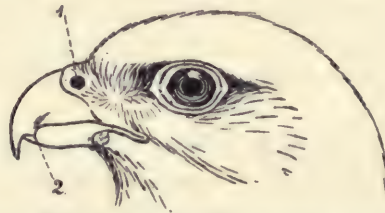
Air-sacs.—The bronchial tubes, which form the termination of the windpipe, after ramifying through the lungs, open into certain thin-walled receptacles known as the air-sacs. These lie along the roof and upper portion of the side-walls of the body-cavity and are filled with air, which is drawn from the lungs. There are five pairs of these sacs in the body-cavity, and they not only assist in the ventilation of the lungs, but serve as reservoirs of air to increase the voice during long-sustained singing, as in the Sky-Lark.

Additional air-sacs in connection with the nasal passages and with the mouth occur in some Birds and serve as sexual ornaments. Such are the throat-pouches of the Adjutant-Stork and Bustard. [*Cf.* preparation in Case 29.] Further, numerous Birds possess smaller air-sacs more or less directly connected with the lungs, penetrating many (and in some cases all) of the bones of the skeleton; while in a few Birds such as

the Gannets and Screamers, these sacs also penetrate between the muscles and beneath the skin. The bones which contain these air-sacs are hollow or pneumatic and consequently have no marrow. In the Albatroses, Gannets and Pelicans, which possess great powers of flight, almost every bone in the body becomes pneumatic, but the Swifts and Swallows, which possess equal powers, have the long bones filled with marrow, as is also the case in Penguins, Grebes, Divers, and the smaller Petrels.

Skeleton [Plate XXV. figs. 5-7].—As regards the details of the structure of the Birds' skeleton, we can only refer here to those points which are either generally characteristic of the Class or which are strikingly correlated to the peculiarities of their life. The bones of the cranium (Pl. XXV. fig. 5 1) become united (coalesce) early in life,

Fig. 8.



Head of a Falcon (*Hierofalco islandus*) to show (1) impervious nostrils, and (2) tooth-like process of the bill.

Fig. 9.



Head of the Black Turkey-Vulture (*Catharistes urubu*) to show (1) pervious nostrils.

about the period when growth ceases, so that the sutures between the bones, which are persistent for so long a period in the Mammalian and also in the Reptilian skull, disappear entirely. As in Reptiles, the skull is joined with the neck by means of a single hinge or condyle (fig. 6 1), the orbits are of very large size in accordance with the great development of the eye (fig. 5 4). The facial bones are more or less prolonged and united to form the beak, which is covered with a horny sheath, the edges of which may be notched (Barbets and Falcons) (fig. 8 2) or serrated (Mergansers), but teeth are invariably absent in living forms. The external nostrils are either pervious (fig. 9 1) or separated from one

another by a septum (fig. 81). The bones of the palate (fig. 62) present four distinct types of structure, which are of considerable importance for purposes of classification. The differences between the four types may be studied in the recess No. 4 of the Central Hall and in the window-case illustrating the classification of the *Carinatae*. The lower jaw is suspended from the skull by means of a movable bone known as the quadrate (fig. 52). The two halves of the lower jaw (fig. 53) are united in front, forming a symphysis, and are covered with a bony sheath in front, like the upper jaw.

In the vertebral column four divisions may be distinguished, viz. the cervical, thoracic, synsacral, and caudal. (1) The cervical or neck division (fig. 55) possesses an extraordinary degree of flexibility, which is necessary owing to the anterior limbs having become exclusively organs of locomotion, and most of the complicated movements executed by those limbs in Mammals and Reptiles have to be performed in Birds by the bill. The number of vertebræ of this division varies from eight to twenty-three. (2) In many birds the thoracic vertebræ (fig. 56) are fused and form a solid bar of bone. The condition is not necessarily connected with strong powers of flight, for though found in all Falcons it does not occur in Eagles, in which the vertebræ are free. (3) The synsacrum (fig. 57) is a long bone, generally formed of the last thoracic vertebra and the united lumbar, sacral, and anterior caudal vertebræ, to which the iliac bones are immovably attached. Although only two of the segments of this series of fused vertebræ can be regarded as true sacrals, the whole series is sometimes described as the sacrum and varies in number from eleven to twenty. (4) Of free or movable caudal vertebræ (58) there are eight or ten, the last being remarkable for its size, shape, and function. From its shape it has been called the ploughshare-bone (*pygostyle*). An examination of very young birds shows that in early life it is composed of from four to ten free vertebræ which become completely fused together in the adult, and form the single bone which supports the tail-feathers and to which strong muscles are attached. Thus, although the tail of a typical adult bird is apparently reduced to a short series of a few segments well adapted for the execution of powerful movements, embryology shows that originally this portion of the vertebral column is very much longer. For instance, in the young Swan it consists of not less than twenty-seven vertebræ, a condition which considerably lessens the apparently great difference between the tail of an adult Swan and that of a Reptile or *Archæopteryx*.

All the thoracic and some of the posterior cervical vertebræ bear movable ribs (fig. 59), their connection with the sternum being effected by means of short sternal ribs (fig. 510). In order to strengthen the thorax, the ribs are connected with one another by bony spurs known

as the uncinæ processes (fig. 5 11 & fig. 7 1). These are flat blade-shaped bones attached to the middle of one rib and sliding over the outer surface of that immediately behind it.

The breast-bone or *sternum* (fig. 5 12) is a large, broad, more or less convex bone which protects not only the thorax, but also a part of the abdomen. In all birds in which the fore-limbs act as the principal organs of locomotion, this breast-bone is provided with a deep crest or keel (13) for the attachment of the muscles of flight. In proportion as the power of flight is diminished, this crest becomes less prominent and may disappear altogether.

The pectoral arch or shoulder-girdle consists of three pairs of bones—the pillar-like coracoids (fig. 5 14), the scapulæ or shoulder-blades (15), which are narrow and sabre-shaped, and the clavicles or collar-bones (16), which are generally united at their lower end and form a V-shaped bone, the *furcula*, commonly known as the “merry-thought.” The principal support of the attachment of the wing to the trunk is the coracoid, which is broadly joined to the anterior extremity of the sternum and forms, together with the scapula, the base of attachment for the *humerus* or upper arm-bone. The fore-limb consists of the following parts:—the upper arm-bone (*humerus*) (17), forearm (*ulna* and *radius*) (18, 19), two small free wrist-bones (20, 21) (carpals), an elongate hand (*carpo-metacarpus*) (22), and three fingers (*digits*). Of the latter, the thumb (*pollex*) (23) is a single styliform bone joined to the first metacarpal and bearing the so-called “bastard-wing” (fig. 2 8); the second or index-finger (24) is the longest, composed of two or three joints, and forms the extremity of the wing, while of the third (25) there is only a vestige. The thumb and index digit are sometimes furnished with a claw.

The *pelvis* of Birds is open in front, a union or symphysis of the pubic bones (26) occurring only in the Ostriches. The shape of the pelvis is remarkable from the great forward prolongation of the iliac bones (27), which may extend forwards on to the ribs. The acetabulum or socket for the articulation of the hind limb occupies a position about half way between the extremities of the pelvis; the centre of the cavity is unossified and appears as a round perforation.

The hind limb consists of the following parts:—the thigh-bone (*femur*) (29); lower leg (composed of the united *tibia* and *fibula* (30, 31), to which are fused the proximal elements of the ankle or *tarsus*); the foot (*tarso-metatarsus* (32), composed of the distal elements of the *tarsus* fused with the *metatarsus* and forming a long bone, generally though incorrectly called the leg); and normally four toes (*digits*). The most characteristic bone of the leg is the *tarso-metatarsus*, which terminates in three articular heads for the attachment of the three front toes in the

majority of Birds, the first toe (*hallux*) (34), which is directed backwards, being articulated with a short separate metatarsal (33). The number of joints of which the toes are composed increases from within outwards, from the first or hind toe possessing two to the outermost (37) which has five.

This general description of the skeleton does not apply in every detail to all groups of Birds; some of them, especially the Ostrich-tribe, showing modifications of certain parts, the most important of which will be found exhibited in a special Case in the Gallery.

Brain.—The brain is much more developed in Birds than it is in Reptiles, and entirely fills the spacious cranial cavity.

Eye.—The power of vision is perhaps more developed in Birds than in any other vertebrate. The eyes are always of large size and protected by two movable eyelids as well as a transparent *membrana nictitans*. The eyeball is strengthened by a broad ring of overlapping bony plates (Pl. XXV. fig. 6^a.) which enables the bird to focus distant objects, and acts as a telescope.

Ear.—The sense of hearing is very acute, but no external ear is developed, and the opening is hidden by the plumage.

Smell, Taste, and Touch.—The senses of smell, taste, and touch are much more imperfect, but some Birds possess one or other of these senses in a higher degree than the rest; for instance, that of smell in the *Apteryx*, that of taste in the Parrots, and that of touch in the Snipes and Ducks.

Digestive System.—With regard to the digestive system, it has already been noticed that teeth are invariably absent in existing birds, but were present in certain types of the Jurassic and Cretaceous periods. The beak and the generally slender horny tongue are the organs of prehension, the former being frequently used to divide the food into small pieces.

The gullet is long, like the neck, and generally dilated into a crop, where the food is stored, detained, and softened for a longer or shorter period. Before entering the stomach or gizzard, the gullet forms a second dilatation with thickened walls, known as the *proventriculus*, in which numerous glands secreting the gastric juices are lodged. In this antechamber the food is subjected to the chemical action of the digestive process, whilst the stomach proper fulfils only a mechanical function. In birds feeding on vegetables, grain, etc., the walls of the stomach are extremely muscular, with a thick horny lining, which (assisted by small pebbles, purposely swallowed by the bird) forms a grinding apparatus capable of crushing the hardest seeds to pulp. In flesh-eating birds the stomach has thin walls and is much more capacious.

The intestinal canal terminates in a *cloaca* or cavity through which the products of the urino-genital organs also pass.

Trachea or Windpipe.—Finally as an important anatomical peculiarity of this class of Vertebrates, we have to mention that the trachea or windpipe is composed of a series of entire osseous rings. The organ of voice is not the larynx as in the mammals, but is formed by a peculiar modification of the lower end of the windpipe called the syrinx. The syrinx may be formed either by the trachea or by the bronchi only, but most commonly the lowest rings of the trachea as well as the bronchi participate in its formation. The modifications of the voice or song of a bird are regulated by a pair of "extrinsic" and, in the Song-Birds, several pairs of "intrinsic" muscles. The former, possessed by all birds, generally pass from the trachea to the *sternum* and *furcula*. The intrinsic muscles may be absent or represented by five or seven pairs. These differences afford important characters for the purpose of classifying certain orders of Birds (*cf.* p. 107).

Nest and Eggs.—Birds are, without exception, oviparous. The majority deposit their eggs in a nest which they specially prepare for their reception. Incubation lasts for a shorter or longer period and varies from 11 to 56 days.

The eggs are on the whole fewer in number than is the case in Reptiles; they possess a large amount of yolk and are invested with a hard porous calcareous shell.

Young.—The young when hatched differ greatly in the relative degree of development which they have attained. In the most primitive condition the nestling emerges from the shell clothed in down and capable of considerable activity, but in the most specialised it is blind, naked and helpless when hatched, and requires to be fed and cared for by its parents for some time.

Mental Faculties.—With regard to their mental faculties, Birds as a class seem to occupy a position intermediate between Mammals and Reptiles. Intelligence of a high order manifests itself in their social relations with one another and in their various methods of obtaining food. These faculties are still more developed in individuals which come in contact or live with man.

Migration.—The difficulty or impossibility of obtaining food when the cold of winter destroys insect-life, or snow hides seed or other vegetable nourishment, compels most birds to leave the locality where they breed. Those which are stationary or range over only a limited extent of country in search of food are termed *resident birds*. Their movements are of an uncertain, erratic nature, and depend on external and atmospheric conditions. But others, as soon as food becomes scarce, following a common impulse, migrate at fixed times and by

ascertained routes far away from the place of birth into milder or tropical climates. Recent observations tend to show that the farther north a species breeds in the Northern Hemisphere, the higher is the southern latitude in which it passes the northern winter. Immense distances are thus traversed by some migrants twice in every year, in their northern and southern movements.

Geological History.—Our knowledge of the geological history of Birds is very scanty. The oldest known bird from Jurassic formations is the remarkable *Archæopteryx*, which has a long tail furnished with a row of feathers on each side. A number of swimming and wading Birds lived in the Cretaceous period, and in some of these the jaws were furnished with teeth. Among the Tertiary Birds there are many Birds widely different from those now living, but they are associated with nearly all the principal types now in existence. The majority occur in Miocene formations. For further particulars the reader is referred to the ninth edition of the "Guide to the Fossil Mammals and Birds," p. 86 (1909).

The number of species of Birds at present known is probably not less than thirteen thousand.

EXPLANATION OF PLATE XXV.

Fig. 5.

Left side view of the Skeleton of a Bird. Iceland Falcon (*Hierofalco islandus*).

1. Cranium.	13. Keel of Sternum.	26. Pubis.
2. Quadrate.	14. Coracoid.	27. Ilium.
3. Mandible.	15. Scapula.	28. Ischium.
4. Orbit.	16. Furcula.	29. Femur.
5. Cervical vertebræ.	17. Humerus.	30. Tibia.
6. Thoracic vertebræ.	18. Ulna.	31. Fibula.
7. Synsacral vertebræ	19. Radius.	32. Tarso-metatarsus.
[hidden in a side view of	20. Radial Carpal.	33. Metatarsal of digit 1
the skeleton by the	21. Ulnar Carpal.	(Hallux).
iliac bones].	22. Carpo-metacarpus.	34. Hallux or hind toe.
8. Caudal vertebræ.	23. Pollex.	35. Inner or 2nd toe.
9. Thoracic rib.	24. 1st Phalanx of 2nd	36. Middle or 3rd toe.
10. Sternal rib.	digit.	37. Outer or 4th toe.
11. Uncinate process.	25. 1st Phalanx of 3rd	
12. Sternum.	digit.	

Fig. 6.

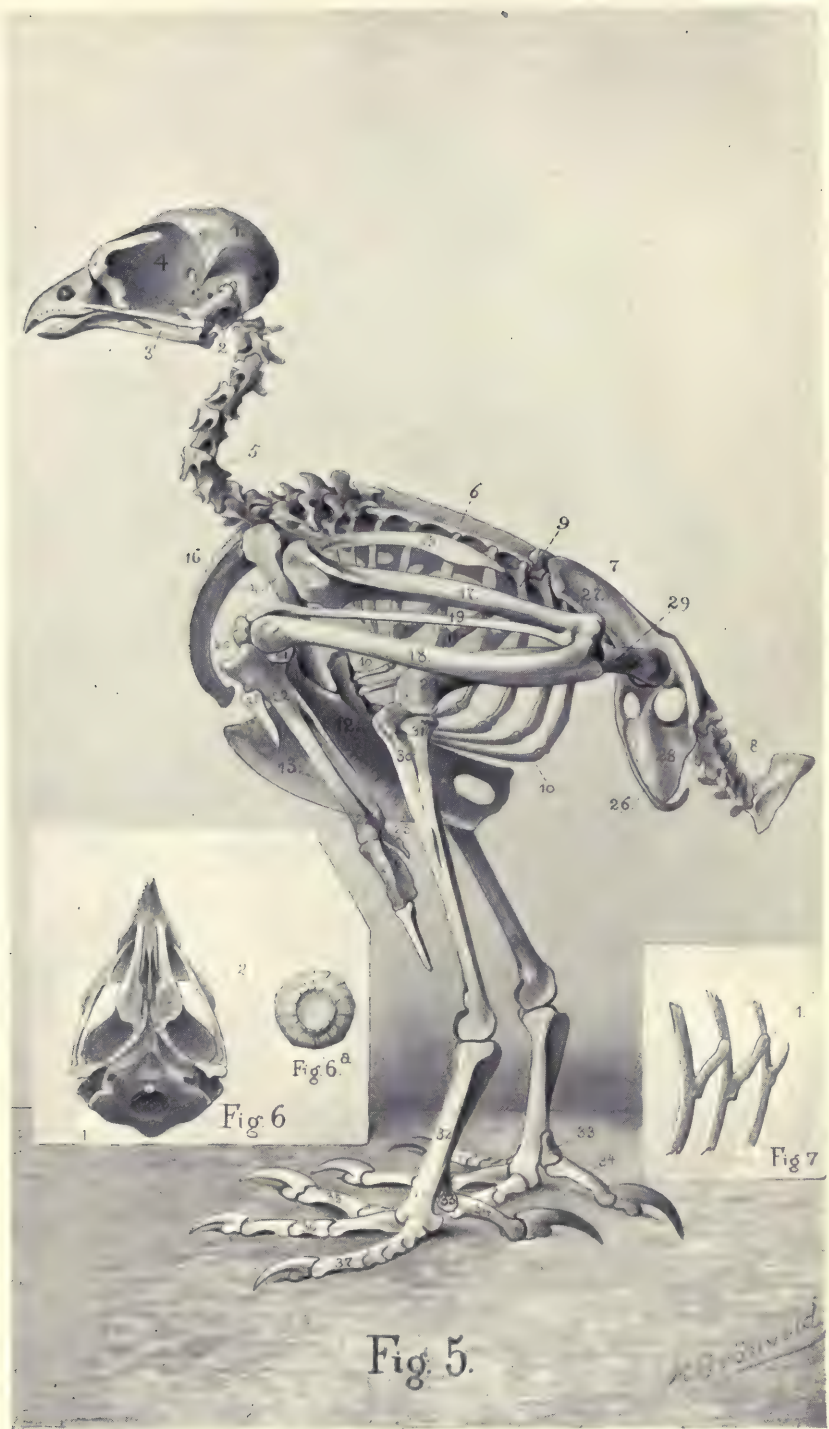
Under surface of the Skull of a Bird showing the bones of the palate (2), and the single occipital condyle (1) for the articulation of the skull with the neck.

Fig. 6^a

Sclerotic Ring of bony plates.

Fig. 7.

Portions of three Ribs to show the position of the uncinate processes (1).



SKELETON OF ICELAND FALCON (*Hierofalco islandus*). No. 944.



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